News of the Industry Begins Page 141

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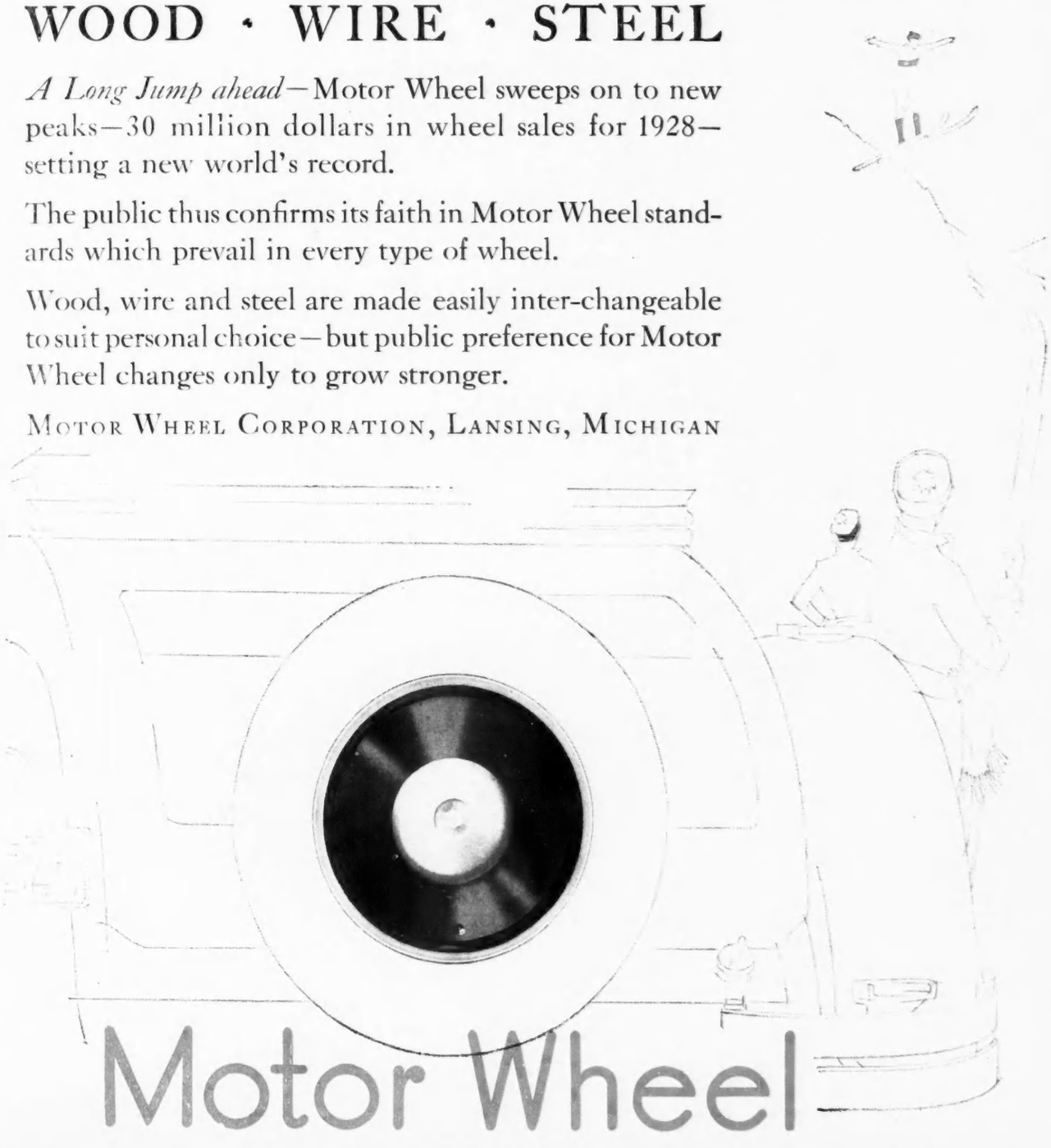

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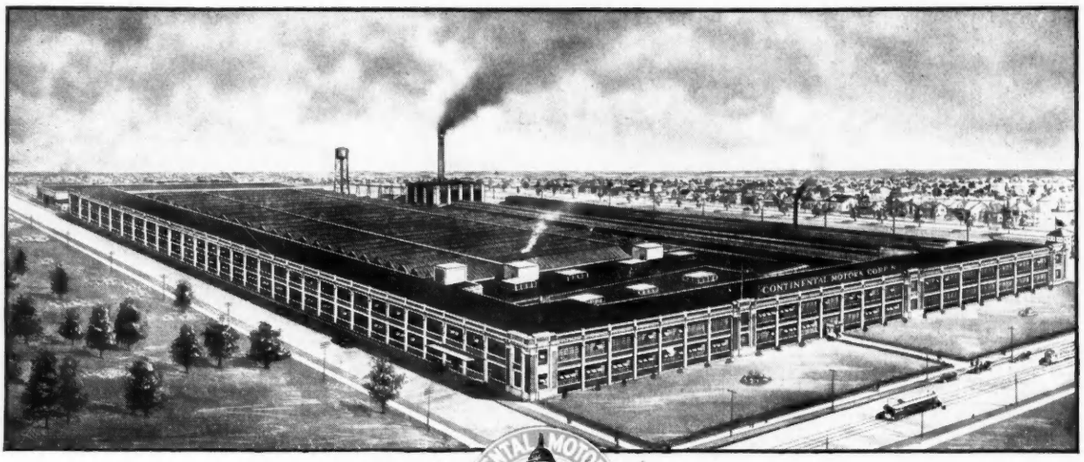

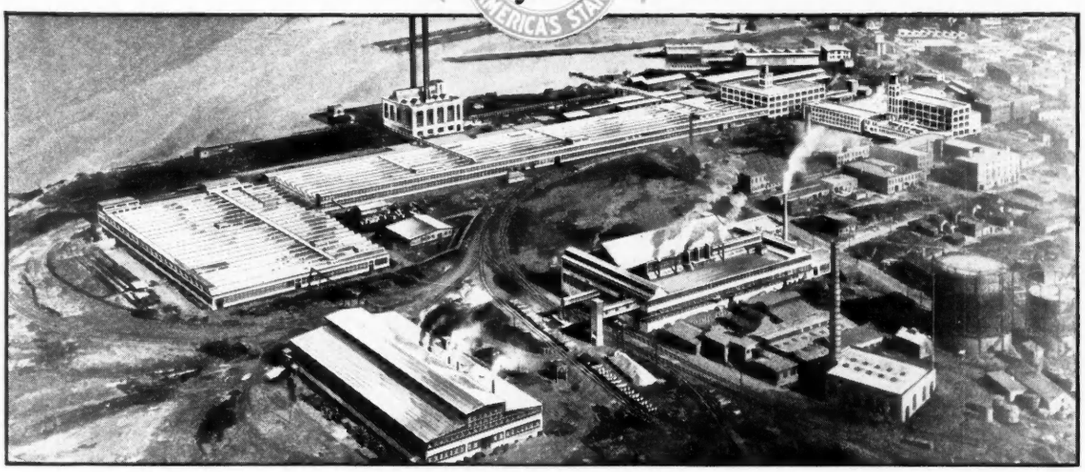

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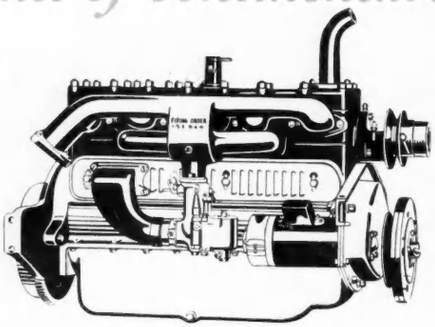

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Contents

Light Car for Export Urged at S.A.E. Meeting. By Lewis C. Dibble 113
Mooney Shows Need of Cheaper Car for Foreign Market 114
Fuel and Ignition Problems Aired at Engine Session. By P. M. Heldt 116
Here and There About the S.A.E. Annual Meeting. By Norman G. Shidle 119
Plea is made for Elimination of Impurities in Steel. By A. F. Denham 121
Front Wheel Shimmy and Tramp Blamed on Axle Design 123
Use of Cracked Gasoline Causes Valves to Stick 124
Ventilating Standard Advocated for Passenger Cars 126
Just Among Ourselves 127
Opinions Vary as to Best Type of 4-Speed Transmission 128
20 to 1 Leanest Fuel Mixture for Starting Engines 130
Rigidity Preferred to Lightness in Valve Mechanisms 131
Fiat Develops Light Plane and Engine for Training 133
336 Cu. In. Engines Sanctioned for 1930 Racing Cars 134
Motor Vehicles Paying Increased Proportion of Highway Tax Bill 136
New Developments 138
News of the Industry 140
Men of the Industry 144
Financial Notes 145
Calendar of Events 148
Advertisers' Index 110, 111

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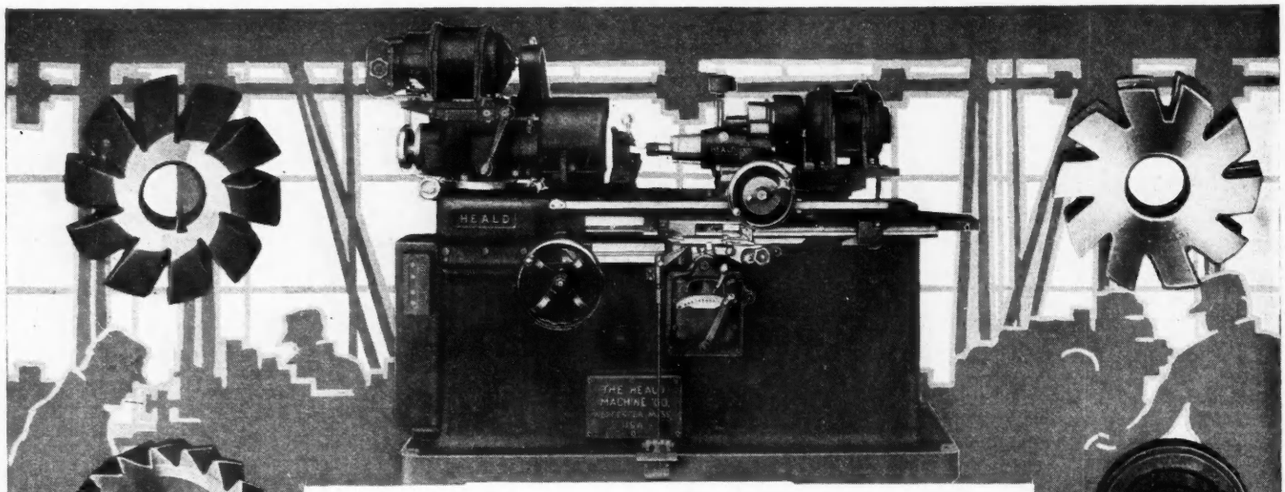

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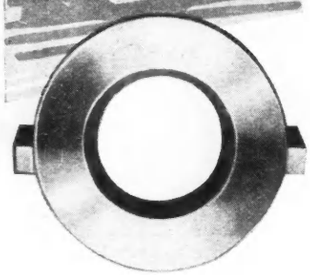

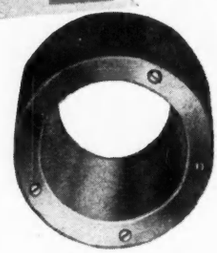

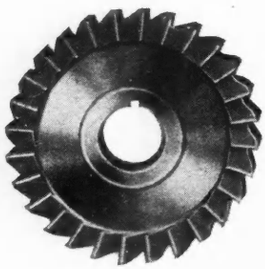

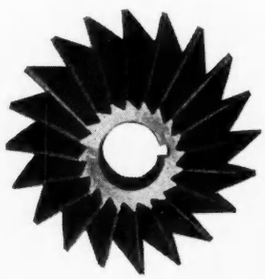

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AUTOMOTIVE INDUSTRIES
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Light Car *for* Export Urged *at* S. A. E. Meeting

Engine ignition problems, dual carburetion and manifolding, body ventilation, behavior of valve springs and front-wheel shimmy among other topics.

By Lewis C. Dibble

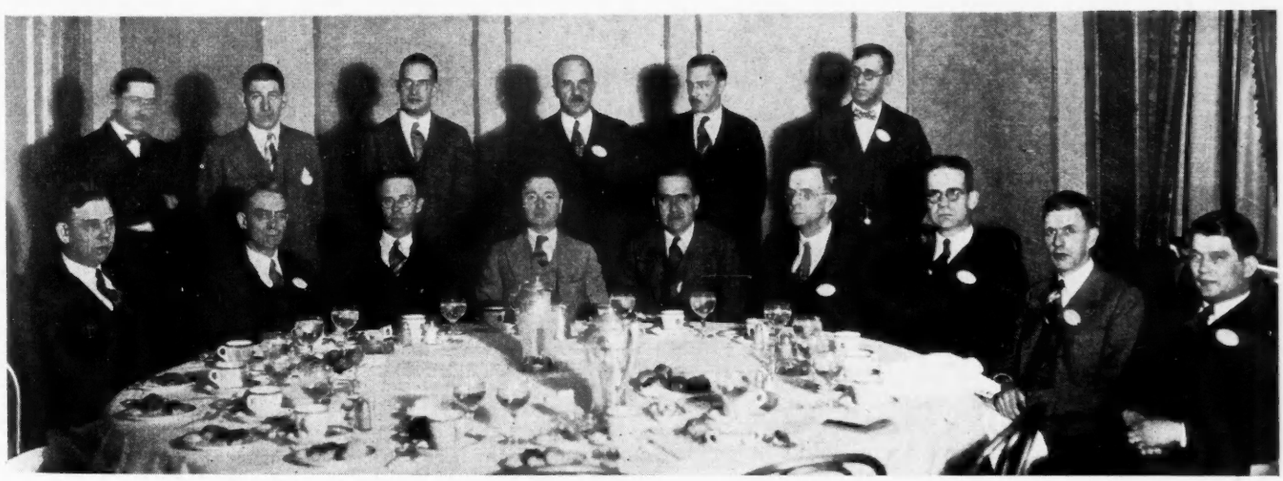
A PLEA that American automotive engineers should give serious thought to the need of developing a light, cheap automobile for the overseas market was an outstanding development of general interest at the annual meeting of the Society of Automotive Engineers, held in Detroit, Jan. 15-18. Discussion of special ignition problems developing from the use of high compression engines and dual carburetion and manifolding situations brought about by straight-eight engines produced some valuable information at the engine sessions. The need for better ventilation in automobile bodies and description of a new instrument developed to analyze and match colors were other high lights of the convention.

"Motor car improvements that are to be expected," said Col. W. Guy Wall, retiring president of the S.A.E., in the president's annual message, "are those designed to increase comfort and safety and reduce the necessity for physical effort on the part of the operator."

The sessions, which were held in the Book-Cadillac Hotel, were well attended. On Wednesday night the Chrysler Corp. was host to the visitors at its new engineering building which was thrown open for the event. On Friday night the society held its annual carnival in Oriole Terrace.

The serious thought that is being given by those close to the export situation to the development of a light and cheap car for overseas countries was contained in a paper prepared by J. D. Mooney, president of the General Motors Export Co., and, in his absence, presented by Clarence M. Foss, engineer of the General Motors staff.

Among other things, this paper developed that there has been a marked increase during the past five years



Attendants at the Wednesday speakers' luncheon conference. The conference brought together the chairmen and speakers of the Wednesday S.A.E. sessions

in the price of America's lowest-priced automobile until today it sells in the foreign market for approximately $800. Standards of living and purchasing power in the United States have risen rapidly and our population is able to absorb the more expensive car, but this is in direct contradiction to the situation which exists overseas.

It was pointed out by Mr. Foss in the discussion which followed the paper that four or five years ago we used to have a car selling for $265. Today the price of this same model has been increased more than 70 per cent, making a much higher corresponding increase in the overseas market. "Have we become so rich and prosperous over here," Mr. Foss queried, "that we cannot have such a car today?"

Paper Arouses Interest

The Mooney paper, which dwelt at length with the overseas market, developed some very interesting material, which, when compared with the situation existing in the domestic market, would make it appear that his plea for a small, light car is well grounded. That his paper will attract considerable attention and study by the industry was the opinion of various leaders during the convention.

From the technical standpoint, one of the most interesting and the best attended session of the entire meeting was the engine session on Friday. Special ignition problems which have developed due to the use of high compression engines were treated in a paper by J. T. Fitzsimmons, engineer, Delco-Remy Corp., and a paper by F. C. Mock, Stromberg Devices Co., on dual carburetion and manifolding, proved equally interesting and resulted in much technical data which is enumerated elsewhere in this issue.

The body session developed two important subjects. In his discussion of body ventilation, L. Clayton Hill, of the Murray Corp. of America, made the assertion that there are no cars manufactured in this country, or abroad, which are really properly ventilated under all conditions. If a ventilating system can be designed to take care of the worst situation that exists, which is driving in a rainstorm in mid-summer in slow traffic, then all operating conditions could probably be met, he said. Mr. Hill suggested the feasibility of utilizing engine power or possibly the flywheel for such a purpose.

Considerable interest was manifest in the paper on "The Color Analyzer," by Dr. A. C. Hardy, Massachusetts Institute of Technology, at the body session. The color analyzer is a new instrument which has been developed at M.I.T. and which will be put on the market by the General Electric Co. It analyzes and matches colors. Operation of the device is based upon the sensitivity of the eye to various colors, especially the three optical primaries, violet, green and red. It matches them as the eye would see them rather than from a pure color angle. This makes it possible to match the color impressions of different types of upholstering materials and finishes on varying kinds of surfaces.

The abnormal behavior of valve springs was discussed at the research engine session and instruments for studying valve actions also came in for considerable attention. The difficulties which may arise from sticking valves through increasing gum content in gasoline, due to new cracking processes, was also fully recognized in the fuel and lubricants session.

A discussion of the theory and cause of front-wheel shimmy, wheel wobble and wheel tramp, was developed at the chassis session. The subject of independent wheel springing was also brought up at this meeting.

A plea for the elimination of gases and impurities in steels, an exposition of the development and principles underlying production grinding, and a demonstration and discussion of a scientifically new method of steel assembly, punching, etc., through the use of pins to which are imparted high velocities through the use of explosives, featured the production session.

Mooney Shows Need of *Cheaper* Car for Foreign Market

Purchasers in other countries unable to pay prices asked at present even for lowest-cost U. S. make.

IN the paper by J. D. Mooney on "Economic Requirements of Automotive Road Vehicles Abroad," which was read by C. M. Foss, Mr. Mooney gave a clear, concise and analytical picture of the development of the foreign market to date, and compared its various aspects with those existing at home. The one thing which stands out above anything else is the fact that buyers overseas are not nearly as affluent as are the American buyers, and at the same time they have to pay much higher prices for the same vehicle. This has tended to make it impossible for the automobile to invade the lower strata of wage earners, which includes by far the largest group of prospective buyers. It is with an idea of reaching this great mass of people that Mr. Mooney suggests the building of a smaller and more reasonable automobile.

A purchaser in the United States five years ago could obtain a usable two-passenger car for as little as $260 and a usable five-passenger car for as little as $290. Today that same make two-passenger car costs $450, or an increase of 73 per cent, and the same make five-passenger costs $460, or an increase of 58 per cent.

Conditions in the United States have been changing: purchasing power has increased, demands are for larger and better cars, and, in consequence, prices have risen. This trend is in exactly the opposite direction to the economic needs of the overseas market. The lowest-priced American car in the overseas market today sells

for around $800, which is an increase of about 200 per cent over the price of the lowest price usable car that could be purchased in the American market several years ago.

Never has there been an American car in the overseas market selling for as low as $260 or even $350. The $800 American car in the overseas market is in a market that has only about 66 per cent of the purchasing power of the American market today. Considering the purchasing power of the overseas market as being in the ratio of 66 to 100 per cent, the overseas market has not reached the same relative position as the United States; yet we find a product in this market that is more expensive to own and operate than it is in the United States.

A Comparison of Prices

In examining the prices of American cars moved into the different countries of the overseas market, an interesting comparison will be noted between these American car prices and (a) the prices of English, French and Italian cars in the English market, and (b) French, German and Italian cars in their own home markets. A number of European cars are in a lower price level than the low-price American cars in European markets.

Automobile taxes in various forms throughout the overseas market, particularly the direct horsepower and displacement taxes, have a bearing on the overall cost of cars. As an example of the effect of a horsepower tax on the selling price, the increase in price of a four-cylinder American car (sedan body) in six principal cities of the world is shown below. Wealth per capita is also shown as a matter of comparison:

Place	Retail Price	Wealth Per Capita	Tax	Total
Detroit, U.S.A.	$675.00	100%	$13.20	$688.20
London, England	1,142.00	90	106.00	1,248.00
Berlin, Germany	1,100.00	41	96.25	1,197.00
Port Elizabeth, S. Africa	1,287.00	23	15.00	1,302.00
Melbourne, Australia....	1,527.75	95	26.75	1,554.50
Wellington, N. Zealand.	1,355.00	92	9.75	1,364.75

The prospective purchaser in the overseas market is not only handicapped by the initial cost of automobiles but he is further handicapped by the increased cost of operation including gasoline, oil, tires and service. All such costs in the overseas market are higher than in the United States. In addition, he is still further handicapped by lower purchasing power.

The present type of American automobile is being sent to the overseas market at the rate of over half a million units a year. The product as it stands partially fulfills the requirements of this market, but since its use is restricted by known factors, the problem is to overcome these restrictions as far as possible and to improve the position as regards its availability. The market needs products of this type but ownership and use should be made as easy as possible.

The initial cost and the cost of operation are major factors in the availability of the product to the potential user and constitute a point around which plans should center toward providing products more generally suitable. The pocketbook value is the factor requiring definite consideration.

It has been shown that the present type of product in the overseas market is located in an upper price range and in this position is above a large volume income class. Even though this product met all the requirements in its class, it would not be possible for the prospective user in the large volume income class to individually own a car of this type; neither would it be possible for all other individuals in the world to own such a car.

In order (says Mr. Mooney) to obtain a car in the low price level in the overseas market, we propose an entirely new product for individual transportation, which will be smaller and lighter than the present smallest American car, and which will be less expensive to own and

C. B. Whittelsey, treasurer (left), and Coker F. Clarkson, secretary and general manager of the S.A.E., photographed between sessions at the Detroit meeting

to operate. We call this new product the Light Car, and give its fundamental requirements as follows:

It must have low first cost and be economical to operate.

The overall cost must be sufficiently low to locate it in the proper price class.

It must have sound pocketbook value.

It must satisfy the condition of transportation.

It must be made readily available to the buying public of the overseas market.

In the design and development of the Light Car it is important that consideration be given to the factors of Appearance, Comfort, Price and Performance. The manner in which these enter into the problem are outlined below.

Appearance—To have correct proportions and the general characteristics of the average first-class automobile of today. Small but not ridiculous—not freakish. Good-looking and appealing. The appearance must be all that can be asked for.

Comfort—The car must not only be comfortable to sit in and to ride in but must be comfortable to operate, to take care of and to service; to have all the comfort possible that can be given in a car of the type and size proposed.

Price—Price class and dollar volume are more important than exact list price. It must be located in the proper price class. Because we propose a small Light Car does not mean it is to be a cheap car. It must be a good car, with satisfactory quality throughout. High quality should be maintained in both workmanship and material.

Performance—It must be efficient and economical. The operating and maintenance cost must be low.

Fuel *and* Ignition Problems *Aired* at Engine *Session*

Influence of atmospheric humidity on power output discussed by Gardiner. Bore-stroke ratio study presented.

By P. M. Heldt

THERE was a large attendance at the engine session on Friday morning which was presided over by O. C. Berry. The three papers presented dealt not so much with the engine itself as with the fuel system and the ignition, and problems connected with these systems were discussed in the light of the tendencies in automobile practice toward higher compressions, higher engine speeds and an increased number of cylinders.

Prof. L. C. Lichty of Yale University read a paper in which he analyzed the economies of the use of anti-knock fuels. He introduced the idea that one of the factors affecting the situation is the increase in the intervals at which an engine must be decarbonized when higher compression ratios are used. Other advantages of high compression are a saving on the amount of fuel consumed and an improvement in the performance of the engine. This latter, of course, cannot be given a dollar and cents value. Therefore, in figuring the possible economy of the use of high compression, the saving on the amount of fuel consumed and on the cost of decarbonizing is balanced against the premium paid for the anti-knock fuel.

F. C. Mock, research engineer, Stromberg Motor Devices Co., spoke at the engine session on "Dual Carburetors and Intake Manifolds"

J. T. Fitzsimmons of the Delco-Remy Corp. read a paper on "Engine Requirements for High-Compression Engines." Higher compressions, of course, call for higher voltages at the spark plugs, and it appears that the ignition equipment of the last few years has had exactly the right factor of safety for the moderate compressions which have been customary, so when it was applied to engines with considerably higher compression ratios, breakdowns often occurred.

The trouble, however, is due not entirely to increased mechanical stresses but largely to increased torsional vibration. In the case of new six-cylinder engines the distributor drive gear may wear excessively in three places 120 deg. apart. Automatic-advance parts may wear when operated at a critical speed of the engine, since the periodic vibration is transmitted to them and causes them to oscillate continuously. This condition makes it desirable to design parts of the distributor so that they will have the least possible inertia and to have rotating parts symmetrical so that their rotating balance will not be affected.

An automatic-advance mechanism, to advance the time of ignition with respect to engine-piston position, is now regarded as an essential part of the ignition distributor for the modern passenger car engine. This feature is also becoming popular on motor coach and truck equipment. The distributor automatic-advance mechanism must be positive in action and free from friction. The design must be such as to allow reasonable changes in the advance curve without extensive retooling. The usual high-compression engine is very sensitive to spark position.

Tolerance Must be Closer

As a rule, high-compression engines have curves with less maximum range, consequently the tolerance must be held closer.

A non-homogeneous or stratified mixture will sometimes occur around the spark plugs at certain engine speeds. In that case the engine must be given the normal spark advance with speed up to a certain point, at which point the engine will miss slightly or exhaustive non-uniformly from the various cylinders. Retarding the spark may eliminate the miss without any apparent increase in power.

A non-homogeneous mixture also manifests itself in other ways. We may find that an engine having the same compression as another of a different design, requires a great deal more voltage at any given speed to fire across the spark-plug gap. The spark required may vary considerably from cylinder to cylinder on certain engines.

Insulating parts which must withstand the secondary voltage are made of phenol resin compounds which contain wood pulp or other cellulose material as a filler, consequently they possess some of the physical characteristics of these fillers. At temperatures in excess of 200 deg. Fahr., additional shrinkage after manufacture may occur, causing trouble with the mechanical fit of parts, these becoming tight or loose in service, depending upon design. It is therefore advisable to mount ignition parts containing this material as far as possible from the exhaust pipe, so

as to reduce trouble from this source.

F. C. Mock, research engineer of the Stromberg Motor Devices Co., gave a talk on "Dual Carburetors and Intake Manifolds." He had obtained horsepower curves from numerous automobile companies using dual carburetors, showing the maxima their engines would produce with both a single and a dual carburetor. The data was presented in the form of charts in which brake mean effective pressure was plotted against engine r.p.m. It was shown that the gain in brake m.e.p. in most cases was greatest at intermediate engine speeds and then amounted to as much as 10 lb. p. sq. in. Mr. Mock said it was impossible to obtain this gain by the use of larger passages with a single carburetor.

One of the reasons for the better performance with dual carburetors was undoubtedly that better distribution was obtained. In the eight-cylinder engine the conditions appear to be just right for the dual carburetor and Mr. Mock said he had never been able to obtain an appreciable gain by the use of dual carburetors on six-cylinder engines.

In manifolds there is what is known as a ramming effect, which tends in general to improve the volumetric efficiency, and this ramming effect is more pronounced in certain types of manifold. The author showed by means of a diagram how an inertia curve is superimposed on the rate of piston displacement curve, which causes a decrease in the rate of air flow during the first half of the inlet stroke and an increase during the second half. The inlet valves should be symmetrically arranged. This was easily accomplished in a four-cylinder engine but not so easy in a six.

To assure fairly uniform distribution the mixture temperature in the manifold ought to be kept at between 120 and 160 deg. Fahr.

A. W. Gardiner (left) and J. T. Fitzsimmons both presented interesting papers on engine subjects

Performance is Discussed at Second Engine Session

THE second engine session, which was held under the chairmanship of Lewis P. Kalb, was devoted chiefly to performance characteristics of engines and factors affecting them. A. W. Gardiner, research engineer of the General Motors Corp. Research Laboratories, presented a paper on Effect of Humidity on Engine Performance, in connection with which there was a prepared discussion by N. S. Diamant, consulting engineer of Chrysler Motors, Inc. A paper on Engine Torque was presented by H. A. Huebotter, chief engineer of the Butler Mfg. Co., which also was accompanied by a written discussion by Dr. M. J. Sucrow of Purdue University.

A most interesting paper on Bore-and-Stroke Ratios was read by Alex Taub, development engineer of Chevrolet Motor Co., and this was followed by the reading of a written discussion by A. J. Meyer of the Continental Motors Corp.

MR. GARDINER in his paper pointed out that in making engine tests the results are usually corrected for atmospheric temperature and pressure, but no correction is made for atmospheric humidity, which also has an influence on the power output.. Tests were made with a single cylinder, variable compression, 3.286 by 4.5 in. test engine at 1000 r.p.m., the air at the carburetor inlet being maintained at 100 deg. Fahr. When the atmosphere contains considerable moisture the amount of dry air or of oxygen taken into the cylinder per cycle is decreased, and hence the energy developed per cycle should be decreased.

Theoretically, at 100 deg. Fahr. atmospheric temperature, the engine torque should decrease 6.6 per cent when the atmospheric humidity increases from nothing to 100 per cent. Actually the observed decrease in "indicated torque" was 7.2 per cent and the decrease in the crankshaft torque, 8.8 per cent, the ratio of decrease in each case being linear. That the shaft torque decreases more than the indicated torque shows that the mechanical efficiency of the engine decreases with increase in humidity (in this case from 83.0 per cent at zero to 81.5 per cent at 100 per cent humidity).

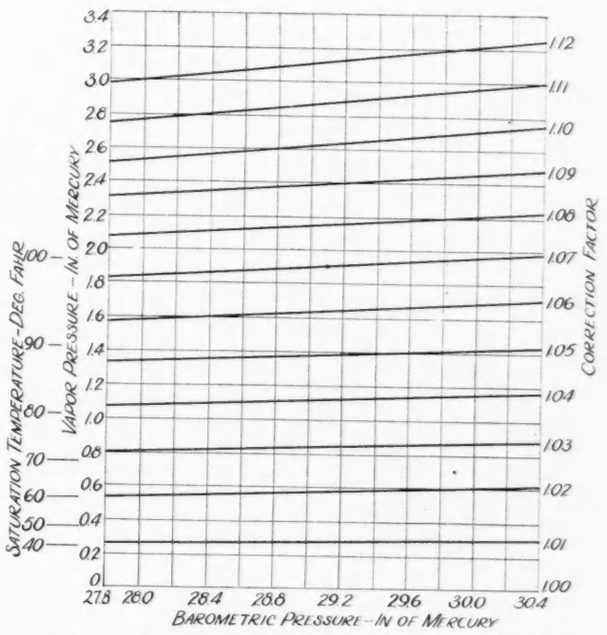


Fig. 1—Chart for obtaining power correction-factor for humidity when vapor pressure and barometer pressure are known

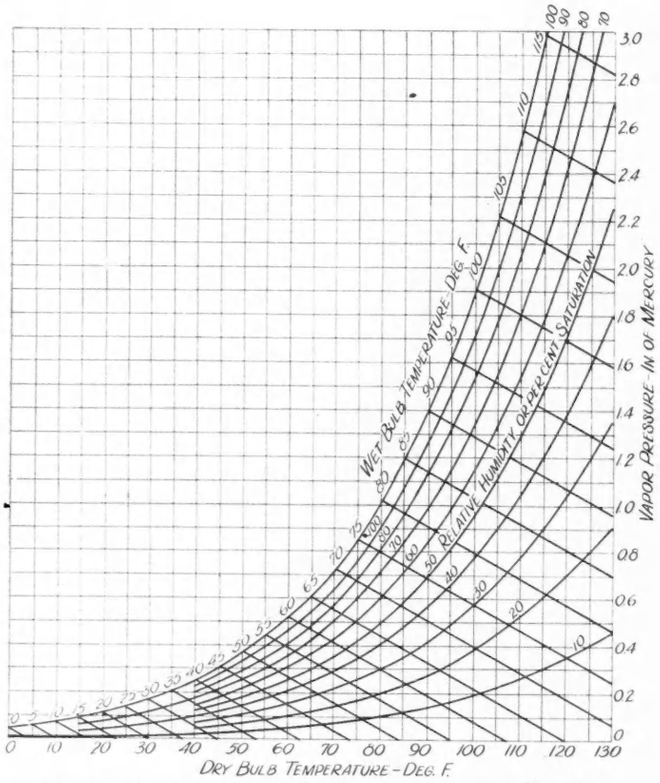

WET BULB TEMPERATURE - DEG. F.
RELATIVE HUMIDITY OF PERCENT SATURATION
VAPOR PRESSURE - IN OF MERCURY
DRY BULB TEMPERATURE - DEG. F.

Fig. 2—Humidity chart giving vapor pressure directly for various relative humidities as a percentage of saturation pressure

Water vapor is of different density from dry air and as a result when water vapor is present in the atmosphere the emission of fuel from the carburetor nozzle should be difficult. For an atmospheric temperature of 100 deg. Fahr., if the humidity increased from zero to 100 per cent the rate of fuel flow decreased 7.3 per cent. This is almost the same as the decrease in indicated torque and there is therefore no change in indicated fuel consumption.

At high humidity a large increase in spark advance is required to obtain the maximum power. It is estimated from the test results that the time required for the combustion is increased 20 per cent by the presence of water vapor (100 per cent humidity). The minimum spark advance for best torque increased from 20 to 28.5 deg. and the spark advance producing incipient detonation from 13 to 28.5 deg. This indicates the anti-detonating effects of water vapor. Mr. Gardiner points out that the effect of the presence of moisture is to give smoother engine operation and that this is often mistaken for an increase in power.

The mixture temperature increased with the humidity, the temperature at the carburetor inlet being constant. This is due to the fact that the moisture has a higher specific heat and vaporation of the fuel, therefore, does not depress its temperature so much.

When the humidity of the atmosphere drops from 100 per cent to zero the heat passing to the radiator increases about 8 per cent and a radiator of sufficient capacity under humid conditions may prove inadequate when the atmosphere is dry.

The correction factor to be applied to torque measurements for moisture in the atmosphere is $P/(P\text{-}e)$, where P is the atmospheric pressure and e the vapor pressure.

Correction factors given by the equation $P/(P\text{-}e)$ are plotted in Fig. 1, with vapor pressure, e, and barometric pressure, P, as coordinates. As dry air is seldom encountered, it might be more logical to assume a standard for humidity other than zero, but the chosen datum is to be recommended as being definite.

Instead of correcting for humidity independently, a combined correction can be employed, in which the pressure of dry air, $P\text{-}e$, is submitted for the barometric pressure, P, in the power correction-factor for pressure.

Thus the correction factor for humidity and pressure is $29.92/(P\text{-}e)$.

This involves a determination of the vapor pressure, e, which can be found from the humidity chart Fig. 2.

As, strictly speaking, the chart in Fig. 2 is correct of but one barometer, the chart in Fig. 3 is submitted, which can be used to correct values taken from Fig. 1 for different barometer-readings. In general, values taken from the chart in Fig. 2 can be used directly, particularly as errors in the use of the wet-bulb and the dry-bulb psychrometer may easily be in excess of the error involved by omitting the barometer correction in ascertaining the value of e.

"Easy to Build Good"

MR. TAUB said an automobile engine from the user's standpoint must be durable, low in upkeep cost and generally cause him the least physical disturbance, while to satisfy the demands of the manufacturer it must "be easy to build good." Although much has been said in favor of the long stroke engine, because its compression chamber has a smaller ratio of surface to volume, which should reduce heat losses, recent developments in connection with the study of detonation point to the fact that combustion chambers with a large ratio of surface to volume, especially during the latter part of the combustion period, are an aid in preventing detonation, and Mr. Taub expresses it as his opinion that a large-bore, short-stroke engine is easiest to "build good."

Mr. Taub deprecated the practice of setting the length of the space allowed for the engine in advance. "There is abundant evidence in the industry, as represented by its products, as to what happens when we start 'to

(Continued on page 120)

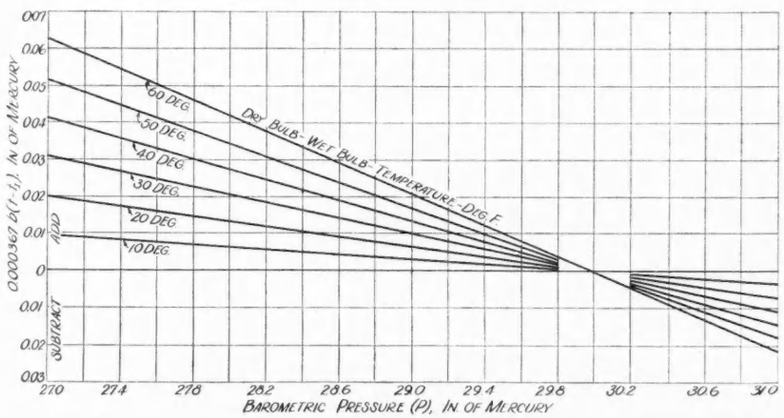


Fig. 3—Chart for use with chart in Fig. 1 to correct for differences in barometer

Here and There
About the S. A. E. Annual Meeting

By Norman G. Shidle

THE Society of Automotive Engineers is just as good as the men whose interest is aroused in its operation," said Henry M. Crane, making what seemed to us the most pertinent observation of the meeting so far as discussion of the internal affairs of the society was concerned.

Mr. Crane was talking about the proposed reorganization plan which will be further discussed at the Summer Meeting before going to the membership for letter ballot, but the remark seems to us to have far deeper significance.

It would make a first class wall-motto for those active society men addicted to such things. It might well be repeated as a sort of invocation or opening creed at the beginning of each committee meeting or council meeting.

* * *

EVERYBODY regretted the absence of Charley Heywood from this 1929 annual meeting, but the regrets were minimized by the pleasure of knowing that he was well on the road to recovery from the attack of influenza which kept him from the sessions.

* * *

F. E. MOSKOVICS presented at the business session the report of the constitution committee of which he is chairman, presided at the evening session on Tuesday and incidentally told us informally that the Stutz Motor Car Co. will not have any official entries in the French 24-hour race next June, although several Stutz owners will probably be in the race as individuals.

We learned from other sources that at least two other American manufacturers are almost certain to have entries in that important French event this year.

* * *

THE site of the Summer Meeting still remains to be decided definitely, despite further consideration of the question by both the Meetings Committee and the Council during the annual meeting. The preference vote of the membership turned out to be far from definite in its implications. The latest tabulation showed French Lick leading in first choice votes by a narrow margin, with Saranac Lake somewhat ahead in total of first and second choice votes combined. The total vote was less than 800. Probable weather conditions, dates available, the various resorts, character of accommodations, and similar factors complicate the choice.

It looks to us as though the final decision will be a compromise based on the weighing of the relation between these various factors. One thing we are certain about, however, and that is that everybody who goes to the place finally decided upon will be glad he went.

* * *

AFTER opening with a none too strong attendance, the meeting kept developing larger and larger sessions as the days rolled on. Total attendance for the week finally went well over the 1000 mark. The probability is that many engineers found it necessary to clean off accumulated work during the first days of the week after being away the previous week at the New York Show.

It seems likely and very desirable that the annual meeting next year be switched back to the third week in January instead of being held in the second week as it was this year.

* * *

F. C. HORNER, chairman of the operation and maintenance committee, was busy during the week assembling the final personnel of that sub-division of his committee which will take up the gargantuan task of trying to evolve a standard truck cost system which will be satisfactory to all types of operators and which will gain widespread usage. Probably no more difficult or complex task has ever faced an S.A.E. committee.

Even after the work itself is completed, the job of getting the system widely adopted remains a big one.

The effort seems worth while, nevertheless, on a number of counts. One which occurs to us is that an S.A.E. approved and formulated system might well be ready and available for adoption by State or Federal bodies should commercial vehicle legislation at some future date develop the need for such a system.

(Continued from page 118)

crowd'." By way of illustration Mr. Taub mentioned an instance where a manufacturer increased the wheelbase of his car 4 in. to meet an artist's conception of how long the hood should be, while in another instance a bus engineer refused the request of a radiator engineer for an additional inch of space between radiator and engine, so as to have adequate room for the fan and belt, because this would have lengthened the wheelbase 1 in. (The wheelbase was 260 in.)

Mr. Taub said in determining the necessary bore he preferred to first select the valve size, and he would use comparatively large diameter valves and a small lift in order not to burden the shop with camshaft requirements. With the valve diameter fixed we can lay out the minimum engine length between bearings, allowing the proper amount of metal and water between each pair of valves. A definite space is thus determined and the largest bore in the desired multiple required that can be placed therein, with due allowance for walls and water space, will be the minimum bore to be used. From the bore the crankpin size can be determined, while the sizes of main bearings and crank arms should be ascertained from the range of performance desired. In this way the proper length of the engine can be determined on a logical basis.

When it is desired to make the engine particularly short by using long strokes, it is often decided to omit water space between inlet and exhaust valve. This has been done many times and the result has always been unsatisfactory, because the product fails to maintain its performance after a period of hard driving and requires frequent valve grinding. There was a time when engines were built without water space between adjacent cylinders, but this practice has been abandoned and its attendant evils have been eliminated; then why should we continue the practice at the most sensitive portion of the engine, the valve and its seat?

Mr. Taub gave some data on two engines, both of 154 cu. in. displacement, one having 2-11/16 by 4½ in. and the other 3⅛ by 3⅜ in. cylinders, which were built as part of a program to study the best relation between bore and stroke. At no time did the small bore engine perform as well as the large bore engine.

It was decided to increase the compression ratio of the small bore engine up to the limit set by detonation and in the course of these experiments it was found that thump or roughness set the limit and not detonation. This was puzzling at the time but can be readily explained now. The large bore engine was run every day for six months while first-aid measures had to be applied constantly to the other engine.

The paper on "Engine Bore and Stroke Ratios" by Alex Taub (left) was treated in a prepared discussion by A. J. Meyer (right)

The gains due to the use of a long stroke were a weight reduction of 15 lb. and reduction in length of 1-13/16 in. There was no water space between cylinders and as a result the valve seats gave trouble.

Fig. 1 herewith is a comparison of the cylinder blocks of two engines that were in production last year, both having piston displacements of 186 cu. in. The cylinder dimensions are 2⅞ by 4¾ and 3¼ by 3¾ in. Both blocks were from the same foundry and the small bore engine gave constant trouble while the large bore engine is still running, its superiority being due largely to its better cooling efficiency. This small bore engine block weighed 40 lb. more than the large-bore block.

In collaborating with a foundry in an endeavor to determine whether some of the recognized evils of the foundry could be side-stepped by the natural roominess of the large bore engine, a new method of cylinder block molding was developed. This method is illustrated in Fig. 2. The block is cast on end, the assumption being that each end is a separate casting, each in itself making a simple mold. The two molds in their respective flasks are put together and the block poured. For each block 145 lb. of core sand was eliminated, which resulted in a large reduction in core ovens and floor space required by same and in the amount of trucking. The mold is of green sand, except for water jacket and valve cores and for the pockets over the main bearings. The general result is castings of greater uniformity, on ac-

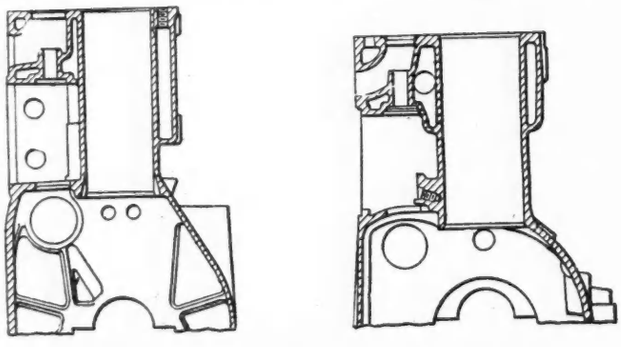


Fig. 1—Comparison of cylinder blocks of two engines, both having piston displacements of 186 cu. in.

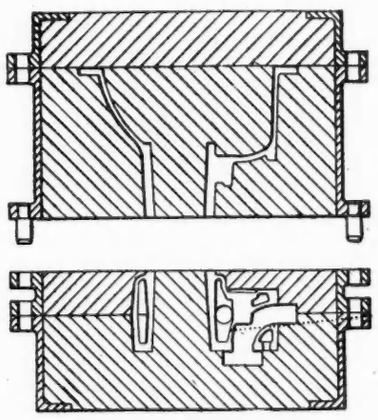


Fig. 2—New method of casting cylinder block for large bore engine

count of the accuracy of green sand handling, improved construction of bearing supports and lower cost.

As regards the crankshafts for the two engines (3¼ by 3¾ and 2⅞ by 4¾ in.) the long stroke engine crankshaft weighed 13 lb. more although its crankpin diameter was only 1⅞ in. as compared with 2 in. for the short-stroke engine. An investigation was made some time ago to determine the effect of metal distribution in the crankshaft on its vibration periods. The crankshaft originally designed was found to be too light, and a family of crankshafts was then produced by adding ⅛ in. to the main bearings, the crankpins and the crank-arm thickness.

The results were as follows: The addition to the main bearing raised the critical speed by 75 r.p.m., which was a negligible gain; and that to the crankpin by 500 r.p.m., which was a real gain. Adding to the crank-arm thickness decreased the spread of the period 50 per cent.

These results afford food for thought, as the general practice today is to make the crankpin diameter considerably smaller than that of the main bearing. The addition to crank-arm thickness produced no change in position of the period, but it served to decrease the duration of the period by 50 per cent, which is a most important gain. Any attempt to gain length of bearing by making the crank arms thinner, though wider, is a practice that should be considered well before being carried through.

The gains referred to were made by the addition of material, and it is of course more desirable to remove material, so it was decided to see what could be done in that direction. Shortening the stroke ¼ in. resulted in raising the critical speed 300 r.p.m. and reducing the spread of the period by 30 per cent. This is another point in favor of the short-stroke engine.

A short-stroke engine needs counter-weights much less, and on account of the shorter throws it is a piece that is much easier to produce in the forge shop. Owing to its greater rigidity the short-stroke crank is also much easier to handle in machining and grinding operations.

Considering the inertia loads, Mr. Taub finds that the loading of the crankpin bearing by inertia and centrifugal forces is 22 per cent greater in the small bore engine. He summarizes the results of his investigation by saying the large-bore engine offers:

(1) A good engine easiest produced
(2) Maximum performance over the longest period
(3) Lower cost of production
(4) Better cylinder-blocks
(5) Better crankshafts for less cost
(6) Greater opportunity for further development.

Plea is Made for Elimination of Impurities in Steel

Production session also featured by paper on progress of chromium-plating and talk on grinding developments.

By A. F. Denham

A FURTHER contribution to the available information on chromium plating, a plea for the elimination of gases and impurities in steels, an exposition of the development and principles underlying production grinding, and a demonstration and discussion of a scientifically new method of steel assembly, punching, etc., using pins to which are imparted high velocities through the use of explosives, featured the production session.

The first was in the form of a paper entitled "Chromium Plating Progress" by M. F. Macauley, engineer, Oakland Motor Car Co., and W. M. Phillips, production engineering staff, General Motors Corp. The second was included in a paper by T. McLean Jasper, assistant chief engineer, A. O. Smith Corp. Production grinding was covered in a paper by B. H. Work, assistant chief engineer, The Carborundum Co., and in a motion picture offered by the same company. Robert Temple, the inventor, provided the demonstration and Frank E. Shepard of Robert Temple, Inc., the discussion of the Temple explosively actuated devices.

Mr. Macauley, who presented the paper on chrome-plating, stated that the most important needed development in this art was the development of full automatic machines, which with nickel plating cut down the floor space required by six-sevenths, and reduced the required man power to about one-ninth that needed with manually operated tanks. Importance of various factors contributing to successful chrome plating was given, Mr. Macauley's analysis being very much along the lines of those given in an article on this subject in the Nov. 17 issue of *Automotive Industries*.

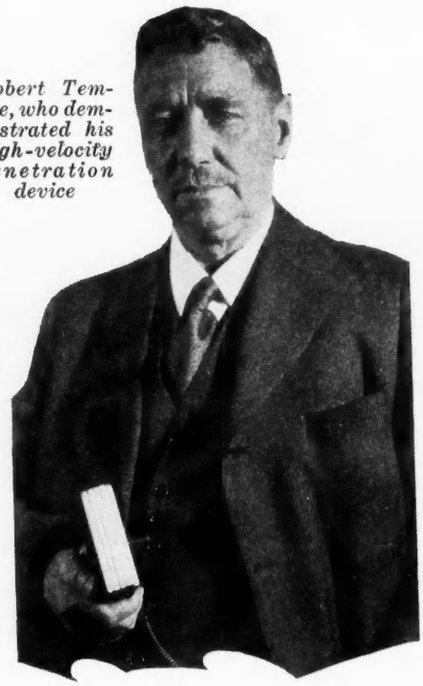
An important recent development is the elimination of the polishing operation, something most manufacturers are working on, since it decreases the finishing cost by about 75 per cent.

Considerable discussion was produced on the proper type of anode to be used. Mr. Macauley had stated that after considerable research on all types of metals a low carbon steel, fully annealed, proved most satisfactory. It was objected that lead chromate anodes were satisfactory providing they were thick enough to carry the required current density without overheating.

J. T. Caldwell, Westinghouse Lamp Co., described an inspection stand developed for chrome-plated parts. Chrome plating being particularly reflective to blue light, "daylight blue" lamps are mounted in this device behind a frosted glass plate, backed up by a reflector trough. The light is directed onto a mat provided with vertical black lines, and deflected again onto the work bench. The light itself quickly shows the spots where the nickel plating has not been covered by the chrome. The black lines are useful since their reflection on the chrome-plated part shows, by distortion, etc., whether there are any scratches or dents in the plated surface.

In answer to a question by Chairman John Younger, Mr. Jasper said the A. O. Smith Corp. was working

B. H. Work (left) discussed production grinding at the production session. T. McLean Jasper (right) contributed a paper on automotive steels



Robert Temple, who demonstrated his high-velocity penetration device

on the development of formulae for the fabrication or forming of steel in cooperation with steel producers. Present formulae, Mr. Jasper stated, while applicable to thin sections, give erroneous results with heavier section. Mr. Jasper in his paper also stated that attempts to replace carbon by alloy steels in frame construction had led to an increase rather than a decrease in weight. "The design of a strong frame," stated Mr. Jasper, "is not a question of high stress resistance but rather of the use of the proper elastic modulus." The elimination of impurities in steel would cut down manufacturing and material cost to a considerable extent, by increasing strength, ductility and resistance to corrosion.

In spite of the efforts toward standardization of grain sizes, wheel sizes, etc., in the grinding field, there are many factors which tend in an opposite direction, according to Mr. Work. In his paper on Abrasives in Production Grinding, he pointed out that the wheel which will give the best grinding action on production work cannot be subjected to variation in working stresses without sacrificing cutting action or abrasive material. The determination of stresses alone is dependent on the relation of work and wheel speeds, the rate of traverse, the arc of contact, the changing wheel diameter, etc.

Different bonding material, different processes of wheel manufacture, different grits and grades, diversity of grinding methods, new grinding equipment, etc., all result in considerable confusion in an attempt at standardization of grinding practice. As a result, cooperative effort of all interested parties is highly essential to assure progress in line with standardization, Mr. Work stated.

Temple Gives Demonstration

Mr. Temple's demonstration and Mr. Shepard's explanation of the Temple explosively actuated devices proved of considerable interest. While not available commercially yet, the device has considerable scientific interest if only in its novelty. Mr. Shepard suggests that it might be used for structural steel assemblies, automobile frame construction, and body attachment to the frame, piercing of holes, etc. It is composed of a rivet hammer-like gun into which a steel pin is loaded. An explosive charge sends this pin into the steel, the explosive being of such quantity that the pin is made to penetrate only to half its length, projecting on either side.

According to Mr. Temple's theory the pin on entering the steel at high velocity imparts an outward motion to the steel atoms, enlarging the hole, to slightly more than the pin diameter, allowing it to enter. The return flow of the steel atoms grip the pin firmly, preventing its further passage through the steel. It is claimed that in a ¾-in. steel plate and ½-in. pin it takes a force of 7 tons to extract the pin. Mr. Temple also stated that any cuts or scratches in the pin are filled up by the return flow of the metal, thus producing a positive locking device.

Mr. Temple stated that due to this flowing action of the metal in the steel plate, which, according to him, does not change the physical characteristics of the steel, the early experiments proved of little value. At that time carbon-steel pins were used, and the pressure of the contracting steel would crystallize the pins, allowing them to break off after a period varying from a few minutes to several hours after insertion. The recent development of a non-crystallizing molybdenum steel has made the final development possible, Mr. Temple stated.

An interesting feature of the gun is that its action is balanced. In actual demonstration there seemed to be no "kick" whatsoever to the gun when fired. It has also been used for punching holes through steel. These holes appear, according to the demonstrated samples, to be as clean as if machined after punching. Mr. Temple believes that there must be a certain fracture velocity to any metal, a velocity of penetration above which will cut a slug right out of the metal without distorting or changing the characteristics of the remainder of the block or plate in which the hole is punched.

It is also claimed that the device may be used in the formation of die-forgings with increased values in the physical characteristics of the product as to density, elastic limit, tensile strength and accuracy and finish of the surface.

Front-Wheel Shimmy and Tramp Blamed on Axle Design

Emphasized by but not entirely due to balloon tires. Brakes partly responsible. Body vibration paper read.

MUCH of the blame for front-wheel shimmy and front-wheel tramp has in the past few years been placed on the shoulders of balloon tire manufacturers. The chassis session therefore proved of considerable interest to this industry. In a paper entitled "Aspects of Motor Car Engineering Associated With Balloon Tires," by Col. J. G. Vincent and W. R. Griswold, Packard Motor Car Co., dealing with these problems from a theoretical as well as practical angle, it was pointed out that the causes of both shimmy and tramp, though emphasized by balloon tires and their lower pressures, are inherent in any conventional front axle design, and that front-wheel brakes are just as much responsible as the tires.

Mr. Griswold, who presented the paper, pointed out that the front end vibrations causing these phenomena, according to his theory, is due to the synchronization of the gyroscopic action of wheels and axle member.

F. F. Kishline contributed notes on frame and body road-vibration at the chassis session

Although most of the discussion of this session was devoted to these problems, virtually forming a symposium on the subject, two other papers of importance were also given. W. S. James, research engineer, Studebake rCorp. presented a paper on production brake lining testing, advocating a selection of lining according to actual car tests as most likely to present the best results, and then checking the consistency of lining purchased by means of physical tests.

A progress report of the research subcommittee on front-wheel alignment was presented by Prof. J. M. Nickelson, University of Michigan. An interesting point brought by Professor Nickelson was that in his checking of new production cars he found that front-wheel alignment in all but a few cars never corresponded with theoretical specifications, indicating a need for alignment inspection after assembly at most plants.

W. R. Griswold, who collaborated with J. G. Vincent in a paper on automobile engineering and balloon tires

Related to some extent to the discussion of shimmy and tramp, a paper on "Notes on Frame and Body Road Vibrations," by F. F. Kishline, Graham-Paige Motors Corp., discussed lateral vibration of the front of the body. Mr. Kishline stated that such vibrations, which include fender and radiator wabble, etc., are produced as a natural outgrowth of designs having other very desirable characteristics, such as balloon tires, heavier front axles, longer motor compartments, double-drop frames, freer spring action, etc.

In the discussion of Messrs. Vincent and Griswold's paper, H. A. Huebotter gave a demonstration of the development of front-wheel shimmy and tramp by means of a simple device consisting of a bicycle wheel mounted in a manner to represent a front axle, spindle and steering spindle, and able to be aligned universally, by means of the steering spindle and simulated drag link, in two directions and by a vertical pivoting of the axle beam in the third vertical direction. By spinning the wheel and then changing any angle, as by tilting the axle through a vertical angle, or by pulling on the steering drag link, the gyroscopic action of the rotating wheel produced a corresponding movement in a direction at right angles to the deflection, which, according to both Mr. Huebotter's and Mr. Griswold's analysis, produces the effect of shimmy and tramp. Mr. Huebotter said that the cause thus being inherent in conventional axle design, the only real solution is to go to independent front-wheel springing, where the gyroscopic action of the wheels and axle would not play the same part in producing these undesirable phenomena.

Mr. Griswold differed with Mr. Huebotter on this, stating that the precessionary forces started by road unevenness were of greater importance in producing

shimmy and tramp than the plain gyroscopic forces, although these also have their effect on a smooth road to a more limited extent.

F. F. Chandler, vice-president, Ross Gear & Tool Co., agreed with Mr. Huebotter, however, in doubting whether shimmy and wabble would ever be fully controlled with a conventional front axle design. George B. Allen, of the Chrysler engineering division, emphasized the importance of this problem, stating that its effect can be observed on any chassis dynamometer with blocks on the front wheels of the dynamometer.

Testing of brake lining was the subject of a paper by W. S. James, Studebaker research engineer

W. F. England, chief engineer, F. B. Stearns Co., corroborated Mr. Griswold in his statement that the double shackling of the left front spring, the rear trunnion shackling being under spring control, overcomes nearly all so-called wheel fight. Before you can do anything with shimmy and tramp, Mr. England stated, you also must have a stiff frame. Mr. England said that in trying the chassis dynamometer reproduction of shimmy and wabble, he noted that the rear wheels also have a lot to do with inducing front-wheel shimmy, through frame weave and distortion. Experiments are now being made by one concern, according to Mr. England, of shackling the front springs at both ends and forcing the front axle to deflect always parallel to itself by means of radius rod bracing.

Mr. Griswold said he doubted that such a method would prove efficacious.

Front End Lateral Vibration

In his paper on body front end lateral vibration, Mr. Kishline had stated that it has generally been found that the stiffer the frame the more violent the shake. In the discussion of this paper, W. C. Keys, U. S. Rubber Co., stated he believed shimmy of the front end was due to instability of the frame, adding that all of the following help in reducing this phenomenon: Frame stiffness, correct castor angle, and wheel alignment; tubular front and rear cross-members; gusseting of cross-members; lateral stiffness of the motor mounting; elimination of steering gear backlash; rebound controls; diagonal radiator bracing; tight body bolts, mounting of the steering column so as to decrease steering wheel overhang. Mr. Keys said that an experiment of his had shown that the mounting of a body on a frame multiplied its stiffness by about six, and with the motor in place, by about 11. Rubber shackling, stated Keys, is worse in this respect than metal shackling of springs.

Use of Cracked Gasoline *Causes Valves* to Stick

Increasing gum content due to oxidation of fuel. Better chassis lubricant needed, says Spicer.

AT the fuels and lubricant session, at which G. A. Round of the Vacuum Oil Co. occupied the chair, two papers on fuel and two on lubricant subjects were presented. J. O. Eisinger, research engineer of the Standard Oil Co. of Indiana, presented a paper on "Importance and Significance of Gum in Gasoline," in the preparation of which he had the collaboration of Vanderveer Vorhees of the same company.

There has been a certain amount of trouble from gum in gasoline from the beginning of automobile history, and the automatic inlet valves used in the early years often stuck to their seat by reason of deposits of this gum. With positively-operated valves the effect must be much stronger to cause any trouble, but it appears that the gum content of gasolines has increased since the introduction of the cracking process. There is even a likelihood of increased difficulty in the future, because automobile manufacturers are increasing compression ratios of engines and calling for fuels of higher anti-detonating values. This is driving refiners to the use of the vapor-phase cracking process, and that means more gum in the gasoline.

The gum is due to oxidation of the gasoline and its proportion increases with the period of storage. Only the gum in the gasoline at the time of use, referred to as the pie-formed gum, affects engine operation. The gum usually collects on the hot spots of the inlet system, particularly the inlet valves. For a certain period while a gasoline is stored there is no increase in the content of dissolved gum, but once the oxidation process has started it continues as long as oxygen is present.

The second paper was on "Knock Testing," by J. P. Stewart, engineer of the Vacuum Oil Co., and was a review of that company's work in this line during the past three years, most of the test having been made by the bouncing pin method. To prevent deterioration of the reference fuel it is kept in solder-sealed 5-gal. cans. Hylidine was used as knock-inhibitor.

From the beginning of the work the necessity for making all tests at approximately the same fuel ratio was appreciated and it was realized that corrections would have to be made for differences in metering characteristics of different fuels. Double adjustable float bowls are used, and the two fuels being compared

are fed at the same rate by volume, which approximates the condition of equal airfuel (weight) ratios.

The mixture ratio selected was one which gave about 10.75 per cent CO_2 in the exhaust, which approximates normal operating conditions. One series of tests was carried out to determine any possible relations between the anti-knock value of a fuel and its physical and chemical properties.

J. P. Stewart, Vacuum Oil Co., whose paper dealt with detonation measurements

No relation could be discovered to the chemical composition. With straight-run gasolines there was found to be a fairly definite relation between the spontaneous ignition temperature and the anti-knock value, but with cracked gasolines this did not hold. Sulphur in gasoline, at least in one particular form of combination, markedly affects the spontaneous ignition temperature without affecting the anti-knock value. Free sulphur affects both values.

If two gasolines of known anti-knock values are blended the anti-knock value of the blend can be predicted with a considerable degree of accuracy. A 50-50 blend has an anti-knock value midway between the values of the two components, but the graph showing the relation between the anti-knock value and the composition is not a straight line but a compound curve with an inflection at the 50 per cent point.

Road tests made with different fuels showed that if the fuels are near the vertical point for the engine and conditions of operation the operator can differentiate between fuels which differ only slightly in anti-knock value, but if there is severe knocking such differentiation is impossible. The author said it had recently been suggested to use a mixture ratio which produced the most intense knock. This was considerably leaner than he had been using.

F. R. Staley presented a paper on "Fluidity and Other Properties of Aviation Engine Oils," prepared by himself and E. R. Lederer, both of the Texas-Pacific Coal and Oil Co. Aircraft engine lubricating oils are divided in the paper into paraffin-base oils, asphalt-base oils and mixed-base oils, and the authors stated that scientific research and actual-performance tests have demonstrated the advantages of paraffin-base oils over asphalt-base oils for aviation engines. Much attention has been given recently to the dewaxing and fractionating of lubricating oils, and this has resulted in an improvement in their quality and in their unrestricted use as "all-weather aero oils."

After quoting statements from several authorities who agree that an oil which will meet both summer and winter requirements is desirable, the authors gave the definitions of viscosity, fluidity, consistency and plasticity determined by the American Society for Testing Materials and then discussed the fluidity or consistency of aviation-engine oils below their A.S.T.M. pour-points and the significance of dewaxing paraffin-bearing oils.

In conclusion, oil consumption was discussed and the subject of the stability of an oil in service was treated. Other methods of testing were outlined and the statement was made that the necessity for dewaxing paraffin-base oils and fractionating them to obtain a close-cut homogeneous product had resulted in the development and installation of new types of equipment for both the steam and vacuum distillation of lubricating oils. The authors said that these developments were of great importance for the development of all high-speed, high-compression, internal-combustion engines.

Plea for Better Lubricant

C. W. Spicer, chief engineer of the Spicer Mfg. Co., read a paper in which he made a plea for a better chassis lubricant. In connection with the production of universal joints he had discovered early that the market did not afford a single lubricant that was really satisfactory in them. All greases are mechanical mixtures of soap and oil, and if these latter are of different specific gravities, in the universal joint they are easily separated. Many of the filling stations throughout the country are still dispensing some form of the ordinary yellow lime cup grease, and the author said he had never seen such a grease that would withstand the centrifugal action in a universal joint. At the time these greases became established on the market the low-viscosity oils of which they are made were cheaper than high-viscosity oils; they are less affected by temperature variations, and the lime greases do not emulsify so readily as soda and potash greases.

Mr. Spicer suggested the marketing and use of lubricants made from the higher viscosity oils. These will carry heavier bearing pressures but will require more powerful guns to handle them than those made for lubricants of low viscosity oils. The author gave the following analyses of lubricants which are suitable for all the high pressure fittings on the chassis, including universal joints, when properly manufactured. The table shows that the lubricant manufacturer has considerable latitude in materials, provided the technique of manufacture is controlled to suit.

Analyses Report No.	249	250	252	254
		Slightly		
	Neutral	Alkaline	Neutral	Neutral
Reaction	%	%	%	%
Free saponifiable oil	1.75	0	0	.5
Lime soap	0	0	0	3.9
Soda soap	13.3	11.6	8.4	12.6
Potash	0	0	0	0
Water	Trace	Under .1	Trace	Trace
Mineral oil	84.95	88.6	91.6	83
(Vis. of min. oil) at 130° F.	250	133	590	880
(Saybolt seconds) at 210° F	61	52	105	120
Flash of min. oil	405	360	440	460
Fire of min. oil	460	415	495	530
Cold test	35	35	60	50

As regards cost of production, Mr. Spicer said all oil companies with whom he had discussed the matter agreed that if the better grade of lubricant could be made in production quantities equal to or greater than the present production quantities of the ordinary cup greases, the cost of the proposed better grade will be not more than that of the present grades of cup greases and possibly less.

Ventilating Standard Advocated for Passenger Cars

Body session devoted to matters relating to greater comfort. Viscuous panel coating described by Stewart.

BODY ventilation, causes and methods of elimination of vibration and rumble, and the analysis and specification of color, were discussed at the body session. The first was introduced in a paper by William Lintern, president, Nichols-Lintern Co.; the second by H. W. Stewart of the Republic Paint & Varnish Works, and the third by Prof. A. C. Hardy of Massachusetts Institute of Technology.

In his paper on Body Ventilation, Mr. Lintern summarized developments along this line in the street car and bus field, pointing out that they followed the adoption of a ventilating standard. He recommended the adoption of such a standard for a definite car speed to assist in the designing of ventilators for passenger cars.

Mr. Lintern expressed himself as being of the opinion that an injection ventilator was preferable to an exhaust type and that the high pressure existing around the joint between the windshield and the cowl could be made useful for this purpose, through the use of a ventilator and ducts taking the air through a heater to a designated point or points in the body.

Clayton Hill of the Murray Corp. stated in the discussion that there is no passenger car body that ventilates at present. Mr. Hill said that the worst condition which has to be met and for which ventilators should be designed is in midsummer in a rainstorm and slow traffic. Any device which depends on car motion would be ineffectual under such a condition. "Why not use 1 or 2 hp. from the engines which the advertisements state develop 115 hp. or more, to provide ventilation?" asked Mr. Hill, stating that possibly the flywheel might be made use of.

In his paper, Mr. Stewart divided the causes for body vibration according to characteristic tones. Sheet steel gives a high vibrating sound, according to Mr. Stewart, aluminum panels a deadened sound, thin steel a higher pitch note than heavier sheet and therefore more pronounced.

In eliminating body noise, Mr. Stewart said that one of two lines could be followed, either allowing the vibration and sound to exist and then absorbing it, or else by preventing vibration by a viscuous panel coating. In line with the first method he enumerated the use of corrugated paper, cork sheets, sawdust, asbestos paper, compositions, etc., for panel lining. On the second method he stated that his company had recently perfected a viscuous coating which is applied under air pressure and does not harden or become brittle, thus retaining its effectiveness in preventing vibration.

W. G. Wall, president of the S.A.E., in the discussion, stated that there were two major causes of vibration and rumble, the first being the transmission of noise from the chassis, and the second the movement of body parts themselves. Fabric bodies, according to Mr. Wall, serve as a good example to show that much of the trouble is due to chassis design, and not the fault of the body engineer.

Professor Hardy's paper on the Measurement and Specification of Color proved to be one of the most interesting that has been presented to the society on general subjects for some time. Professor Hardy, at M.I.T., attacked the problem of color analysis from a psychological-physical angle. The physicist, he stated, determines color by the intensity of light reflection through the entire visible spectrum, plotted as a curve with percentage reflectivity as the ordinates and wave length within the spectrum as abscissae. The psychologist, however, judges colors by the effect on the beholder. Mr. Hardy then determined the primary colors as far as the eye is concerned, these being violet, green and red.

Starting with the spectrophotometric method of analysis, this enabled a simplification to three wave lengths and led to the development of the colorimeter, which recently has been developed to a stage where it gives the psychological attributes or any color directly in percentage numbers, 100 being the effect of pure white.

Suggestions for better car ventilation were made by William Lintern (left). O. T. Kreusser (right) was a speaker at the evening body session

Just Among Ourselves

Seiler Stages Party for Supply Men

NOT content with having injected two or three rather emphatic ideas into the truck business in the last few months, Paul Seiler, and his General Motors Truck Co. associates turned usual practice upside down again last week when they staged a party at their Pontiac factory for over 100 executives of parts and supply companies from whom they purchase units and materials. The purpose of the meeting was to give these suppliers a clear idea of the plans, prospects and policies of the big truck organization, that they might be better able to cooperate with it and that the common aims and possibilities of this manufacturer and his supplier might be emphasized. That purpose was achieved in a frank, brief, effective manner.

* * *

Big Feature of Meeting Was Spirit Behind It

THE session was the most important public manifestation of constructive attitude toward suppliers that we have been privileged to contact with. And the best part of the whole thing was that the guests were supplied with interesting, useful facts; were encouraged to ask questions about anything they wished and were not talked *at* for even so long as a second. The whole idea, it seems to us, was a definite and commendable departure. An item in the news section tells a little more about what actually happened; the important thing, however, was the spirit which prompted the meeting in the first place. Unquestionably it is the spirit which in the long run means most satisfactory results for the vehicle manufacturer as well as for his sources of supply.

* * *

Mooney Reopens an Old Discussion

J. D. MOONEY, president, General Motors Export Co., wasn't present at the S.A.E. meeting last week to read the paper which he had prepared in collaboration with Clarence M. Foss, an engineer of his staff, but the paper started more conversation around the meeting than almost any other just the same. The remarks made in the paper about light cars caused the conversation. There has been plenty of discussion for many years about the possibilities and probabilities of an American-built light car, of course, but definite public comments on the subject from any executive of such importance as Mr. Mooney have been lacking.

* * *

Domestic Requirements Block Development

THE light-car idea, so far as American producers are concerned, has always foundered on a single rock in the past; the type of light car produced abroad has practically no market in the United States and consequently the volume necessary to low cost could not be obtained by domestic sales as in the case of our standard-type cars. Can a light car be produced selling here for $250 or less, meeting foreign horsepower tax requirements on a favorable basis, and still having sufficient power, rider comfort, attractiveness of appearance, and ruggedness to make likely some reasonably large sales here as well as abroad? That would seem to be the question, the answer to which will determine whether or not the production and sale of the type of car suggested by Mr. Mooney is practicable. The answer of the past to this question has been quite definitely "No." The answer of the future, of course, remains to be seen. Our personal guess is that it will be "Yes," assuming that by quantity production we mean something in the neighborhood of 150,000 to 200,000 vehicles a year at least.

* * *

Statesmanship in Industry

SAM A. LEWISOHN, vice-president, Miami Copper Co., ends his book, "The New Leadership in Industry," with this sentence: "There is as much opportunity for statesmanship in the industrial field as there is in the political field." The sentence offers a good starting point for executive reverie as the automotive industry goes into 1929. There is just as much difference between the sharp, shrewd moneygetter and the far-seeing builder of industries and businesses as there is between the great statesmen of American history and perennial office seekers in our political life. In business life even more than in political life, it seems to us, like breeds like in organization building. It is encouraging to find throughout the automotive field a growing number of men of the Owen Young-A. P. Sloan type; as this genre increases, the stability, the effectiveness and the value as well as the profits of our industry seem certain to be pushed to new heights.—N.G.S.

Opinions Vary as to Best Type of 4-Speed Transmission

Two-speed rear axle also considered in paper by Durant engineer. Crane doubts value of development.

ALL the pros and cons of four-speed transmission, compared respectively with three-speed units of normal type and internal gear type, and split up in themselves again into overdriven and underdriven variations, were again aired at the transmission session. At least every side and opinion had an opportunity to present itself and did so.

Carl D. Peterson of Durant Motors led off the session with a paper entitled "Axle Ratios and Transmission Steps," but which in effect was an exposition of the desirability of using either a four-speed gearbox or a two-speed rear axle to make higher road speeds with lower engine speeds possible.

In the discussion, C. A. Neracher, consulting engineer, whose discussion was read by G. A. Rounds of the Vacuum Oil Co., broke the subject down into the next step, advocating the internal gear underdriven four-speed unit on the basis that the overdriven type increases the propeller shaft speed approximately 40 per cent, and also penalizing the overall efficiency of the car while operating in the overspeed gear by about 2 per cent. Underdriving, according to Mr. Neracher, also makes for lighter rear-axle construction.

E. S. Marks took a prominent part in the discussion of axle ratios and transmission steps

E. S. Marks, chief engineer, H. H. Franklin Mfg. Co., ventured the opinion that the question of adoption of four-speed transmission would depend largely on the public's choice in the near future. "The public expects maximum flexibility with a minimum of gearshifting," stated Mr. Marks. The Franklin company recently adopted an internal gear transmission but of the conventional three-forward-speed type.

H. M. Crane, General Motors Corp., pointed out that the four-speed gearbox as such is an old story and that it came in and went out again years ago. At that time, however, its reason for adoption was the relative inflexibility of the engines. Mr. Crane agreed with the previous speakers that lower engine speeds were highly desirable at high road speeds, not only from a wear and tear angle but also so as to reduce both fuel and oil consumption. The latter, Mr. Crane pointed out, is approximately in relation to the cube of the engine speed. On the other hand, he questioned whether such a move was actually essential, and if the public actually worries much about fuel consumption, or desires extremely high acceleration on direct speed at a sacrifice in other directions.

"There is no need in passenger cars for extremely low low-gear ratios as in trucks," stated Mr. Crane. "In the truck field," he continued, "the use of four-speed gear boxes is becoming more and more universal due to the general policy of the operator in overloading trucks.

Road Speed a Factor

"If all cars were operated at around 60 to 70 m.p.h., we would probably use four-speed transmissions, or if anyone built a permanently quiet four-speed transmission at a reasonable cost it would have more of an advantage than it has at present. In tests on a car thus equipped at the General Motors Proving Ground, and which was not driven particularly hard, the transmission became noiser with time."

Regarding the selection of proper transmission gear ratios, Mr. Crane pointed out that car owners are more usually than not prone to stick to high gear until gearshifting becomes absolutely essential, and that this should have a considerable effect on the selection of the ratio for the next lower gear, probably resulting in a lower reduction than would normally be used to assure quick get-away.

Mr. Crane said that in his opinion the public is not intelligent enough to get the full benefit of a four-speed transmission. A car with a four-speed unit should be started on the level in second speed, then shifting into fourth. On a hill it should be started in low, then shifted into third, either staying there, or going into fourth. In his observation, Mr. Crane stated, he had never seen any driver operate a four-speed unit correctly the first time. In concluding, Mr. Crane propounded the theory that "You must never put into an automobile anything that costs much money unless it is of decided value to more than half the owners. This is true of the four-speed transmissions. Their adoption requires educational work among purchasers."

Following a discussion prepared by Clark Mather of the Warner Gear Co., which agreed largely with

the viewpoints propounded by Mr. Neracher. F. C. Thompson of the Morse Chain Co. read his discussion in which he took the attitude that there was a place in the scheme of things for all types of transmissions. Regarding the overdrive type in particular, Mr. Thompson said that it should not be condemned without sufficient investigation. With present rear axle ratios ranging from 3.2 to 5.6 to 1, Mr. Thompson said he would recommend transmissions somewhat as follows:

Rear Axle Ratio	No. of Speeds	Direct on
3.2 to 3.8	3	3rd
3.8 to 4.0	4	4th
4.0 to 4.75	4	3rd or 4th
4.75 to 5.6	4	3rd

If direct on third is used in a four-speed unit, the fourth speed should be about 27-30 per cent overspeed. Such a scheme would obviate the entire redesigning of an automobile to use a four-speed unit, according to Mr. Thompson, who, however, agreed that it would be desirable to cut down propeller shaft speeds.

After the presentation of these viewpoints on transmissions in general, two other subjects were taken up. Floyd A. Firestone of the University of Michigan demonstrated and discussed an instrument recently developed at the University for the measurement of sound in gears. The device is equipped with an audio frequency tuning device which enables its tuning to a definite pitch to determine the characteristic pitch of a gear noise. This determination, according to Mr. Firestone, would then determine which are the troublesome gears, since the pitch is a function of the number of teeth. The device, he said, is at present used by Timken Axle for production inspection of rear axle gears, and Timken Bearing for the production checking of anti-friction bearings for noise. It is also being adopted by Dodge Brothers. A recent development in transmission devices, seen for the first time in production cars at the New York automobile show, the "No-Back" reverse lock developed by R. L. Wallace, and produced by Detroit Gear & Machine Co., was a timely subject for discussion. Its design was explained by Mr. Wallace. Discussion of the paper failed to develop any serious objections to the device except in that a parked car could not be pushed back by another car trying to park ahead of it, and that a sticking Bendix gear could not easily be loosened by the usual method of putting the car in high and pushing it backward. The device itself has been previously discussed in these columns. It is now standard equipment on the Stutz Blackhawk and the Peerless straight-eight.

THE paper by Carl D. Peterson of Durant Motors, Inc., pointed out that in recent years axle ratios have been made high and wheel diameters decreased to secure high-gear flexibility with three-speed transmissions, resulting in high engine speed at even moderate car speed. This gives flexibility at the cost of smoothness and economy. Another alternative consists in the use of a low axle ratio and a large engine, but this necessitates a larger clutch, propeller shaft and gears, and nearly every part of the car must be increased in size and weight, resulting in higher cost to the manufacturer and user, while the car is also more expensive to operate.

With the idea of securing high car speeds at considerably lower engine speeds, to reduce vibration set up by the engine at high engine speed and secure greater smoothness, and of establishing a load condition on the engine in the high-gear range to give economical fuel consumption, a car was produced having the following general characteristics:

Curb weight, sedan ..... 3300 lb.
Weight, with driver and observer .... 3700 lb.
Frontal area ..... 27.5 sq. ft.
Rolling diameter of wheels ..... 29 in.

The car is driven by a six-cylinder engine having 3⅜-in. bore and 4⅝-in. stroke, giving a piston displacement of 248 cu. in. It was calculated that the maximum hp. of the engine, at 3100 r.p.m., should give the car a speed of about 72 m.p.h., hence a high gear reduction of 3.72 to 1 was required. The low-gear ratio was arrived at on the assumption that at maximum engine power the car should be able to climb a grade of 20 to 25 per cent in first speed. A low-gear ratio of 14.6 to 1 was decided upon, which gives a grade ability of a little more than 23 per cent.

Four-speed reductions give an added flexibility that is not available with three-speed reductions; however, to secure the full advantage of four-speed reductions, two of the four must be efficient and quiet. One of them can be either an extra speed in the rear axle, in one form or another, or an internal-gear reduction replacing the noisy third-speed spur-gear reduction of a conventional four-speed transmission. The internal-gear reduction has been provided in the transmission of the car being considered.

W. R. Strickland, president-elect of the S.A.E., was in evidence at the various meetings and delivered an address at the body session

The next question that arose was that relating to the most desirable steps in the transmission. In the past, ratios in a geometrical series have been much used, but ratios in an arithmetical series also have been considered. The lowest and highest reductions being set, the intermediate ratios for both series are fixed. In the following table are given the different ratios for a geometrical series, an arithmetical series, and the ratios actually adopted:

Speed	1	2	3	4
Arith. series	3.92	1.94	1.32	1
Actually used ...	3.92	2.391	1.394	1
Geom. series	3.92	2.55	1.62	1

It will thus be seen that the ratios used lie nearly midway between those which are obtained with an arithmetical and with a geometrical series.

20 to 1 is Leanest *Fuel* Mixture *for* Starting Engines

Follow-up work at Bureau of Standards on determination of vapor pressures described at research session.

DEVOTED largely to the purely scientific aspects of the subjects covered, the four papers presented at the research session fell into two groups. The first, on fuels, was represented by a paper on Vapor Pressure Data by Oscar C. Bridgeman, of the Bureau of Standards, and two papers on Operating Factors and Engine Acceleration, and Economic Fuel Volatility and Engine Acceleration, both by Donald B. Brooks, also of the Bureau. The second part, on headlights, was covered by a paper dealing with recent research on headlights, by H. H. Allen, of the Bureau.

Mr. Bridgeman's paper dealt largely with the determination of vapor pressures in the 0 to 10 per cent volatility range, completing the information on determination of such data up to 90 per cent. In effect it therefore supplements previous work of the Bureau along these lines. Ten gasolines were used in Mr. Bridgeman's work, and the correlation of data indicated the possibility of computing all of the data by means of a single equation from either the normal bubble point or the 10 per cent A.S.T.M. temperature, with considerable accuracy.

Questioned by J. O. Eisinger regarding the lowest vapor pressure with which starting of a motor can be effected, Mr. Bridgeman replied that 20 to 1 was found to be the leanest mixture, the actual mixture ratio depending largely on the carburetor used. Thus a 2 to 1 mixture with 10 per cent volatility would give a 20 to 1 ratio. The vapor pressure under average conditions required for starting is around 10 mm., according to Mr. Bridgeman.

Mr. Brooks' first paper was a report on the continuation of acceleration studies on three fuels having widely differing 50 per cent A.S.T.M. points. The first report, given at the last midsummer S.A.E. meeting, showed that accelerating characteristics seemed to vary considerable at different manifold temperatures. Carrying this work out further through a range of from 10 deg. C to 100 deg. C of manifold temperatures it was shown that there is a consistent variation in the relative accelerations obtained with these special fuels as the manifold temperatures varied.

Further investigation then developed the following conclusions:

1. The effect of the A.S.T.M. 50 per cent point on engine acceleration, or on the quantity of fuel required to give a stated acceleration, appears to be negligible, except under summer operating conditions.

2. Under summer operating conditions, unless special acceleration devices are provided, the acceleration improves or the required fuel decreases, with decreasing A.S.T.M. 50 per cent point.

3. Current practice in carburetor adjustment makes it probable that some increase in fuel consumption would follow an increase in the A.S.T.M. 50 per cent point.

Dr. G. G. Brown, of the University of Michigan, in the discussion, stated that his laboratory experiments were in entire agreement with the results obtained by Mr. Brooks. He suggested that for winter driving conditions some lower temperature figure than the 50 per cent A.S.T.M. point be used as a basis for comparison. Thirty per cent actual volatility may mean only 10 per cent on the A.S.T.M. curve, Dr. Brown stated. In reply to a question by Mr. Eisinger regarding what percentage of fuel should be vaporized for satisfactory operation, Mr. Brooks stated that this depends on the amount supplied and that there is no evidence of need for vaporization since combustion is also obtained with atomized fuel.

In his second paper, Mr. Brooks presented data on acceleration tests made with less than the full number of cylinders firing; on the effect of jacket temperature when the manifold temperature is low; on the effect of spark advance on acceleration; data obtained when accelerating as in low gear, and data showing the utility of the engine accelerometer in measuring engine friction.

H. T. Woolson, chief engineer, Chrysler Corp., was a speaker at the session held in the Chrysler engineering laboratory Thursday evening

From this friction data the following conclusions were drawn by Mr. Brooks:

1. Engine friction obtained by motoring does not necessarily represent the operating friction, the disparity increasing with increasing oil viscosity.

2. Accelerometer friction values more nearly represent those under operating conditions, differing from the dynamometer values in the right direction and by approximately the right amount.

3. At the same speed and jacket water, oil and manifold temperatures, the full-throttle engine friction varies with operating conditions affecting the cylinder wall temperature. At high temperatures, how-

ever, this variation is found as a rule to be slight.

With reference to the effect of jacket water temperature at low manifold temperature, the conclusion is drawn that at air-fuel ratios sufficiently rich to insure good acceleration at low speeds, poor acceleration is obtained at higher speeds only when the jacket temperature is high.

Loss of acceleration noted at high jacket temperatures is ascribed to decreasing volumetric efficiency, and at very low jacket temperatures to a high heat loss.

In the discussion, Mr. Brooks agreed with a comment of Mr. Eisinger's that it would seem that to a certain extent engine design is more important than the fuel used in obtaining good acceleration.

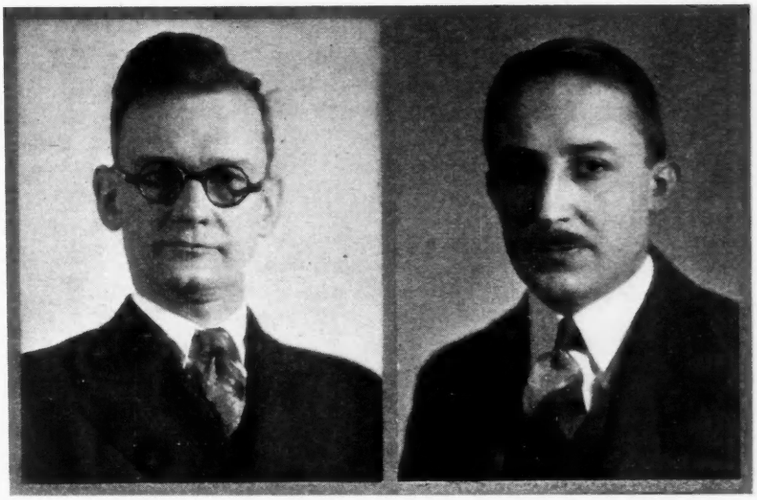
Mr. Allen's paper on headlight research was in the nature of a summary of the progress to date, the work not being completed as yet. Studies were made under straightway, curve left and curve right conditions for varying vertical and horizontal beam spreads, varying intensities, etc., and their relation on visibility. A tentative relationship is established by Mr. Allen between the intensity of light coming into the driver's eyes and that necessary on the road shoulder to insure good visibility of the latter.

Rigidity Preferred *to* Lightness in Valve Mechanisms

Abnormal behavior of springs is subject of paper at engine research session. Indicator cards analyzed.

TWO papers were presented at the engine research session on Thursday morning dealing with abnormal behavior of valve springs and with instruments for studying same; one paper was devoted to a new method of interpreting indicator cards, and in a fourth the history of development of a stroboscopic type of engine indicator was traced. Alex Taub occupied the chair at this session.

Ferdinand Jehle and W. R. Spiller, respectively research engineer and laboratory engineer of the White Co., presented a paper on Idiosyncrasies of Valve Mechanisms and Their Causes. They pointed out the objectionable results of valve spring surge, viz.: loss of power, wear and breakage of parts, and noise, and gave it as their opinion that in the design of valve mechanisms rigidity should never be sacrificed for lightness, although low weight is otherwise very desirable.



Ferdinand Jehle (left) and Robert Janeway. Both were on the engine research session program

A study of valve motion can be made by means of some sort of stroboscope, such as the vibroscope, but engines are not designed to facilitate study of their valve motions and the parts involved are hard to get at. For this reason a special machine and instruments of four different types were developed at the White laboratory for the purpose of such a study. The four types of instruments are:

1. Telescopic point-by-point indicator.
2. Stroboscopic projector of the valve motion.
3. Valve-lift-curve indicator.
4. Valve-lift-curve indicator with a spring-vibration indicator.

In the first mentioned indicator a pointer is secured to the head of the valve and the end of this pointer is sighted through a telescope arranged to swing around a pivot close to the valve over a graduated sector. The valve head and pointer are arranged in a relatively dark box which is stroboscopically lighted up by means of a neon lamp instrument (vibroscope). The telescope is then swung around until the end of the pointer is in its focus when the dark box is lighted up, which corresponds to a certain point of the cycle. By suitable calibration the valve lift for any point of the cycle can thus be determined.

This apparatus is extremely accurate for measuring valve lift. As it is difficult, however, to obtain a preliminary idea of the valve action with this, it was decided to build an instrument that could be used in conjunction with the telescopic indicator for what might be called qualitative analysis of the valve motion. With this second device it was possible to watch the motion of the valve at reduced speed and enlarged scale so that the interesting speeds could be selected. The more accurate observations could then be made with the telescope at these speeds.

In this device a ray of light from a powerful source passes first through a condensing lens, then over the end of the pointer on the valve and then through an

objective lens which focuses an image of the end of the pointer on a screen. A stroboscopic disk is placed between the objective and the screen at the neck of the beam. This disk being rotated at a speed slightly lower than that of the cam operating the valve, an image of the valve motion at greatly reduced speed is obtained on the screen.

While the combination of these instruments gave good results, it was not possible with them to study valve performance with satisfactory speed. It was, therefore, decided to develop a valve-lift indicator that would project the valve-lift curve.

The instrument is not unlike that last described but the image, instead of being thrown onto a screen, is thrown onto a 45-deg. mirror by which it is reflected onto an octagonal rotating mirror, which in turn reflects it onto a screen. The rotating mirror rotates in synchronism with the cam and the image on the screen has both horizontal and vertical movement and traces the valve-lift curve.

The spring vibration indicator, finally developed, projects on the screen a stationary image of the wave motion of a coil of the spring.

Before violent surging develops, the spring must be subjected to a periodic force having a period equal to the time taken for a wave to travel up and down the spring. This is the simplest type of spring vibration and causes the most severe surging. If the frequency of the driving force is twice as great, then the first overtone of the spring is excited, and a condition arises that is similar to a propagation of waves from both ends of the spring simultaneously. This results in the phenomenon of a "standing wave," with a node or stationary point at the center of the spring. In other words, the spring appears to vibrate in halves. In like manner, standing waves of higher frequencies can be produced, but they are of progressively less importance.

W. R. Spiller, one of the authors of the paper on "Idiosyncrasies of Valve Mechanisms and Their Causes"

W. T. Dankin and H. H. Clark of the Cleveland Wire Spring Co., Cleveland, Ohio, presented a paper on The Electric Telemeter and Valve Spring Surge. The telemeter is an instrument devised at the Bureau of Standards some years ago whereby very small motions are measured electrically by causing the moving parts to press on piles of carbon disks, whose electrical resistance varies in accordance with the pressure on them. The authors adopted this instrument to the measurement of valve motions, an oscillograph being included in circuit with the stacks of carbon disks and a source of current and a graphic record (oscillogram) of valve motion thus obtained. They also analyzed these valve motions on the basis of the harmonic theory. From the results of their investigations on valve motion by means of the telemeter they draw the following conclusions:

1. Low-frequency springs are to be avoided because, at engine speeds within the driving range, the springs tend to come into resonance when excited by the lower order of harmonics of the complete valve-lift curve; and the lower harmonics have very appreciable amplitudes, as a rule.

2. High-frequency springs are to be desired because, within the same driving range, the resonance points are due to the influence of the higher harmonics, which usually have much less amplitude than the lower harmonics.

3. Springs having a continuously variable pitch are valuable in minimizing the effects of surge. It is important that a few of the active coils should close up solid when the valve is open. The effect of the change in the number of active coils is to alter the frequency of the spring continuously throughout the lift of the valve. Thus, resonant conditions are prevented by interference in the wave motion, although the surge amplitude at high speeds may have certain points of minima and maxima.

4. High-frequency variable-pitch springs are preferable to low-frequency variable-pitch springs.

5. As a rule, if more than one to three coils of a variable-pitch spring are closed as the valve lifts, the total number of active coils must be rather large. This will cause the spring to have a low frequency when it is on the baseline portion of the valve-lift curve. The lower harmonics, which act throughout the whole lift-curve, will cause the spring to vibrate badly during this portion of its cycle, even though severe resonant points are eliminated.

R. N. Janeway, consulting engineer, gave a lengthy paper on Interpretation of the Indicator Card. In interpreting an indicator card the temperature-energy characteristic of the medium used must be taken into account. According to a fundamental thermodynamic law, the total energy content of a gas at a given temperature is the heat required to raise the temperature from absolute zero at constant volume. Fortunately, this data is available for all of the constituents of the working medium and the resultant temperature-energy relation for the mixture can be readily determined. This relation defines the gain or loss in intrinsic energy of the gases between any two temperatures. By comparing the work done by or on the gas between the same two temperatures as shown by the indicator card, it is possible to determine the direction and magnitude of the accompanying heat interchange.

Dr. H. C. Dickinson said at the Bureau of Standards they had analyzed numerous indicator cards taken with the same instrument (the Fainboro indicator) and had generally found the exponent to be substantially uniform for the whole of the compression and expansion lines from 1.37 to 1.40 for compression and from 1.25 to 1.32 for expansion. One speaker suggested that the apparent large heat loss during the early part of the expansion might be due to vaporization of fuel still in the liquid state.

Kalman J. De Juhasz of the Engineering Experiment Station, Pennsylvania State College, outlined the development of his high-speed engine indicator which has been previously described and illustrated in these pages. It will be remembered that this is of the type employing a drum-type indicator which is placed in communication with the engine cylinder for an instant during each cycle, so that the effect on the indicator is that of a constant or slowly varying pressure.

Fiat Develops Light Plane and Engine for Training

Two-passenger, enclosed fuselage plane has wing spread of 34 ft. The A 50 radial, air-cooled engine develops 95 hp. at 1800 r.p.m. Weight of empty engine is 275 lb.

Fiat two-passenger light plane

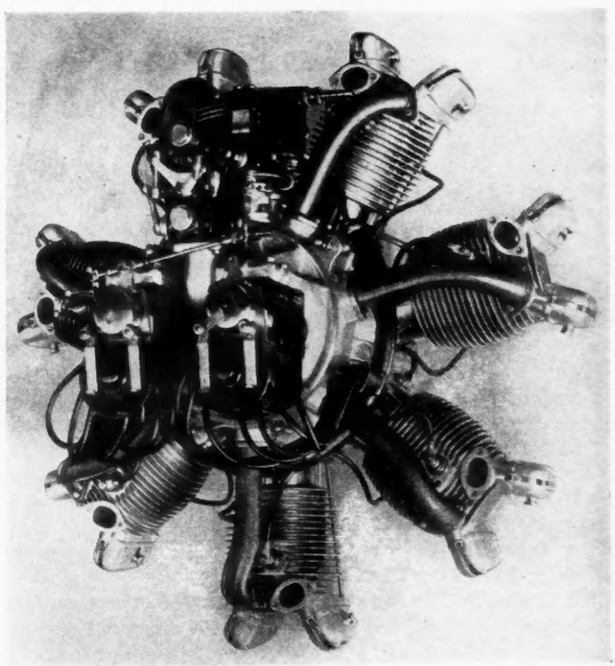
DECIDED to develop aerial touring and to give opportunities to the youth of the nation to acquire flying experience, the Italian Government is encouraging manufacturers to take up the construction of light airplanes and low-powered engines. The first of the machines of this type has been built by the Fiat company and is a monoplane of 34 ft. wing spread, a length of 21 ft. 9½ in., and with a two-seater fully enclosed fuselage under the wings. The plane is fitted with a fixed radial seven-cylinder Fiat engine of 3.9 by 5.51 in. bore and stroke, and is said to be so efficiently silenced that conversation can be carried on in the cockpit without difficulty.

The Fiat A 50 engine, which is the first of this type to be built in Italy, develops 85 hp. at 1600 r.p.m. and 95 hp. at 1800 r.p.m., for a weight empty of 275 lb. Its external diameter is 35 in. and length 30 in. Cylinders are steel forgings heavily ribbed, with ribbed aluminum heads screwed in hot. Valve seats are of special bronze and are screwed hot into the cylinder heads, and the valve guides are of cast iron. There are two valves per cylinder, inclined at 29 deg., and closed by concentric springs. The valves are operated by push-rods and rockers carried on roller bearings, each overhead mechanism being contained in a two-piece aluminum housing.

A cast aluminum basechamber in two parts receives the cylinders on studs and carries the epicyclic timing gear, with a single-plate cam, rotating in the same direction as the crankshaft. On the rear of the crankcase casting is a housing constituting a collector for the mixture supplied from a Zenith C 1961 carburetor, the body of which is heated by the lubricating oil. Seven intake pipes radiate from this casing to the cylinder.

The oil pumps are at the rear of the engine, and consist of a pressure pump delivering oil to the two main bearings, to the connecting rods and to the timing gear. The scavenger pump has a capacity 50 per cent greater than that of the pressure pump. Two Marelli magnetos are mounted on platforms on the rear of the crankcase, each one supplying current to a full set of plugs. These latter are placed horizontally, one in front and one on the rear face of the aluminum head.

Forged in two parts, the crankshaft is completely drilled for lubrication and is united on the crankpin. Two counterweights are fitted. The main bearings are of steel with white metal spun in.



Fiat 85-hp. fixed radial air-cooled aircraft engine

336 Cu. In. Engines *Sanctioned* for *1930* Racing Cars

Specifications as drafted by A.A.A. for Indianapolis meet also stipulate two seats, minimum weight of 1750 lb., and not more than two poppet valves per cylinder.

SPECIFICATIONS to govern entries in the 1930 Indianapolis 500-mile race, and which have been heralded as a medium that will renew the interest of the automobile manufacturer in the speedway, have been announced in an official bulletin by Val Haresnape, secretary of the Contest Board of the American Automobile Association. The bulletin states that changes may be made in the regulations, since the Indianapolis Speedway does not intend to issue them in final form until the day of the 1929 classic. Following are the regulations as stated in the bulletin:

Cars Eligible. In general, specifications laid down for the race are designed to produce either (a) a car susceptible of adaption from production car chassis, or (b) development cars that embody new engineering principles or adaptions as contrasted against what may be termed "normal" cars. All cars must pass satisfactorily the inspection of the Race Technical Committee as to safety of design and construction, otherwise full freedom is given within the general restrictions imposed in the following rules.

Displacement. Cars will be limited to a maximum piston displacement of 336 cu. in. (6000 cc. or 6 liters).

Wheelbase. There will be no restriction on wheelbase other than the general restriction that the car must be handleable.

Weight. A minimum weight of 7½ lb. p. cu. in. displacement is fixed with a final minimum of weight irrespective of displacement of 1750 lb. The weight shall be that of the completed car but without fuel, oil or water. A formula may be used to obviate actual drainage of the oil.

Tread 54 to 60 In.

Tread. The tread measured at the center of tire contact with the road must lie between 54 and 60 in.

Body Type and Measurements. The cars must have bodies with two seats, with the body width across the driver's seat not less than 31 in. at the base of the seat. The seat for the mechanician must be alongside the driver, although it may be staggered not more than 12 in. with respect to the driver's seat.

Valve Mechanism. In poppet valve type gasoline engines a limit is placed of two valves per cylinder. No restriction is made as to the number of valves in any other type, for example, sleeve, rotary valves, and so on, or in Diesel engines.

Supercharger. On four-cycle gasoline engines, supercharging is prohibited. A positive displacement supercharger may be used on two-cycle or Diesel engines.

Number of Carburetors. Not more than two carburetors may be used on four-cycle gasoline engines. A duplex carburetor even though it has but a single float chamber will be regarded as two carburetors. No restriction for 1930 will be made in the number of type of carburetors or manifolding in the case of two-cycle, Diesel or semi-Diesel, or turbine engines.

Brakes. Two independently operated systems of brakes will be required on every car. The secondary system must not be vulnerable to any failure of the primary system. The primary system must operate effectively on all four wheels and be capable of continued use without failure and of arresting the car within reasonable limits. A standard test as to braking effectiveness will be devised by the Indianapolis Race Committee. The secondary system need be effective on but two wheels and must be capable of arresting the car from hundred-mile-an-hour speed not less than five times in succession without failure. A detailed test for both effectiveness and for repeated operation will be laid down by the Indianapolis Race Committee.

Transmission. The transmission system must incorporate a declutching device and a reverse as well as a forward speed.

Name. The following regulations will govern the naming of all cars in this class: All names are subject to the approval of the Contest Board at the time of registration. The initial naming of a car must be made not later than the date of closing of entries of the first competition in which it is entered.

Cars may be named:

(a) After a manufacturer, provided the main components (presumed to be the engine and transmission at least) are designed by said manufacturer. The intention is to permit factories to race either under the name of their product or incognito, as they prefer. If under their trade-mark name, the factory should at least design and have supervision during the construction of its cars. Factories will not be permitted to race a product as their own in the case of cars purchased already constructed. All disputed cases are to be referred to the National Technical Committee of the Contest Board who as a committee of the whole will hear the evidence pro and con and their decision will be final:

(b) After the owner or owner-driver. This is to permit any race car to be named after its bona fide owner.

(c) After a recognized accessory in national use and upon regular sale, provided that the accessory designated must be actually used in its regular way in or upon the car.

Names Prohibited. A car may not be named after a manufacturer by others unless the written consent

of the manufacturer concerned is filed with the Contest Board on or before the first application for registration, nor is a car to be permitted to resemble the product of any American manufacturer without such written consent. This regulation applies particularly to radiator, hood, hub caps, and other individual characteristics.

No change in name after the initial christening may be made without first obtaining approval of the Contest Board. In general, cars named for a manufacturer or an accessory will be required to be altered substantially in appearance. In no case will they be permitted to be named for a second manufacturer. They may be permitted to be named for a second accessory provided there is a bona fide sale and the new accessory is actually used, as in the first instance. There is no intention to restrict the renaming of cars after new private owners. In all cases, however, notice must be given the Contest Board not less than 30 days prior to the authorized use of the new name even where permission is granted.

Larrabee Has New Line

INTERCHANGEABILITY of major units and of many parts features the new line of trucks offered by Larrabee-Deyo Motor Truck Co., Binghamton, N. Y. The line ranges in capacity from 1 to 3½ tons, and a 5-ton unit of the same design will be announced later. Model designations and capacities are: 20, 1 ton; 30, 1½ tons; 40, 2 tons; 50, 2½ tons; 60, 3 tons; 70, 3½ tons.

Six-cylinder engines are embodied in the entire line. Internal Lockheed hydraulic brakes are incorporated in all models and vacuum boosters are connected to the master cylinders on the models of 2-ton rating and upward. Disk type propeller shaft brakes operated by lever and pneumatic tires are standard throughout the line.

Continental engines are used, the 16C seven-bearing L-head 3⅜ by 4⅝ in. in the 1 and 1½-ton models and the R series of overhead valve engines in the larger models. Four engines in the R series are interchangeable in chassis and any engine of the series may be had in any chassis from 2 tons up.

Bevel gear, double reduction and worm drive rear axles are employed. Bevel gear is used on the 1 and 1½-ton models, option of bevel, double reduction or worm on the 2 and 2½-ton and double reduction or worm on the larger units. Optional axles are interchangeable.

Radiator shells and cowls of Models 20, 30, 40 and 50 may be interchanged as may these parts on Models 60 and 70. Springs in the first group of models have the some width and length, the increase of capacity from 1 ton up being accommodated by greater thickness. Likewise springs of the 60 and 70 models have the same mountings. Fender crows, slip hangers, brake and clutch pedals are the same on all models. Drag links on 20, 30, 40 and 50 are interchangeable.

In the entire line there will be only two radiator shells, two cowls, two fender crowns, one step hanger,

Larrabee-Deyo Model 50 truck

two rear spring hanger castings, one rear spring frame bracket, two front shackles, two rear shackles, two starters and two distributors and one design of dash electrical equipment. Hydraulic brake equipment of Models 40, 50, 60 and 70 is interchangeable and corresponding parts of brake systems of Models 20 and 30 may also be exchanged.

All heavy models are equipped with unit powerplant mounted four-speed transmissions but amidship mounted seven speeds are supplied at extra cost which does not include extra fitting or mounting. Dual tires are standard equipment on Models 40 upward in carrying capacity. Optional wheelbases are supplied without extra charge, within limits shown in specifications, this being accomplished by using the longest wheelbase frame in production and cutting it down for shorter jobs. Twenty-five combinations of wheelbase are accommodated by 11 driveshafts. Gasoline tanks are mounted in cowls, this construction being used because of low seat position in coupe type cabs.

Panel, express canopy and stake bodies are offered for the models up to 2½ tons and dump bodies and a large van on the larger models. Dump bodies are available also for the 1½ and 2½-ton models.

AN agreement has been entered into between the Robert Bosch Co. of Stuttgart, Germany, and the Atélieurs de Construction Lavalette of Paris, whereby Bosch magnetos and other electrical equipment will hereafter be manufactured also in France and distributed by the Lavalette organization, which has been engaged in this line of business for a long time.

The Eleventh Annual (1929) Statistical Issue of* AUTOMOTIVE INDUSTRIES *will be published February 23. Extra copies, which many subscribers find it advantageous to have, should be ordered now. Price, $1 each.

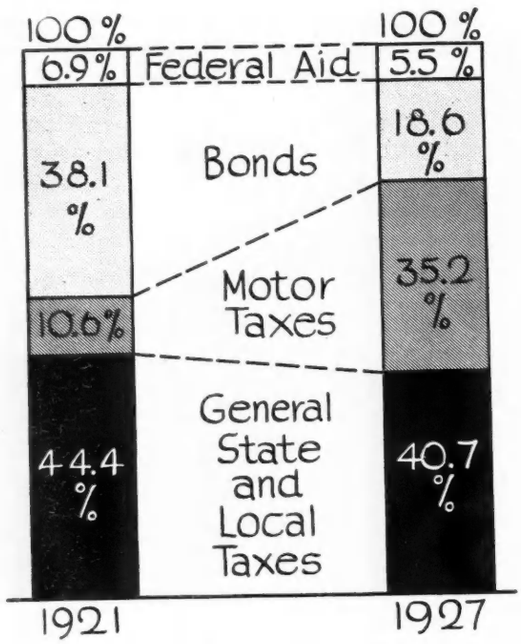


Fig. 1—Chart comparing sources of highway income in 1921 and 1927

Motor Vehicles Paying of Highway

Special automobile taxes in 1927 rural road expenses in 1927.

ANYONE still supposing that motor vehicles are dodging the expense of road construction and maintenance and saddling the burden on the general public or the railroads will learn quickly the fallacy of this assumption by studying a brochure which has just been prepared by John E. Walker, former special assistant on taxation to the Secretary of the Treasury, for the National Automobile Chamber of Commerce.

Among other things, Mr. Walker shows that—

Special motor vehicle taxes in 1927 were 35 per cent or one-third of the total highway income, although this income had increased from $240,000,000 in 1914 to $1,465,000,000 in 1927. In 1914 special motor vehicle taxes were 5 per cent of the total rural highway income.

Virtually all of the current costs of *main state* road construction and maintenance are now paid from special motor vehicle fees. Only about one-tenth of the costs are now derived from general taxes.

Railroad Share is Small

In 1927 rail taxes used for highways amounted to less than 2½ per cent of the total highway income.

Six-sevenths of these rail levies were expended not for main trunk highways but for the improvement of secondary or local roads, a greater part of which are tributary to rail transportation.

Motor trucks not only pay for the use of the roads but they pay twice as much in special taxes per vehicle as private automobiles. The common carrier motor truck of average size pays $303 or 15 times as much as a private automobile. The common carrier buses pay $512 per vehicle or 24 times as much as the private car.

The general taxes paid on public and private garages, filling stations, repair shops and all other levies which are paid by all business are not included in any of these figures.

Motor vehicle tax collections accounted for 66 per cent of the increases in the total of state taxes collected in 1927 as compared with 1922.

Fifty-three per cent of the total highway expenditures is handled by county authorities and 47 per cent by the states.

Rural highway income for the year 1927 amounted to $1,465,076,204. Expenditures for rural highway construction and maintenance were $1,412,711,423.

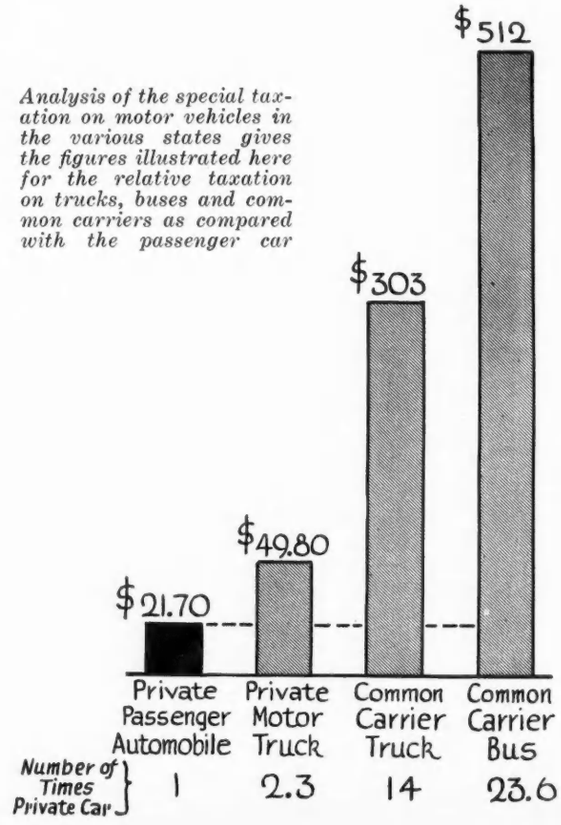
General property tax levies and miscellaneous sources of revenue produced $596,163,022 of the total highway income. Since the total of state and local taxes collected, less special motor vehicle taxes, amounted to $5,180,000,000 (state taxes 15.4 per cent; local 84.6 per cent), it appears that general taxes paid 11.5 per cent of the state and local highway income.

A comparison of the highway income figures for 1921 and 1927 reveals some marked shifts in the amounts of income derived from the different sources. The most notable changes occur in the amount of bonds sold and in the tremendous increases in motor vehicle taxes.

The direct payment of special taxes by the motor user to the highway program has increased from 5.1 per cent in 1914 and 10.6 per cent in 1921 to 35.2 per cent in 1927.

The 1927 highway income figures reported by the U. S. Bureau of Public Roads are compared with 1921 figures from the same sources in Table 1.

Analysis of the special taxation on motor vehicles in the various states gives the figures illustrated here for the relative taxation on trucks, buses and common carriers as compared with the passenger car



Increasing Proportion Tax Bill

defrayed 35.2 per cent of Bond issues decreasing.

The proportion of funds derived from general property taxation as compared to the total highway income has remained constant, increasing at approximately the same rate as the total income for highway purposes.

It is evident from the comparative figures that two things have taken place: first, *a large increase in the total program, with the ratio of general property tax contributions remaining constant;* and second, *a tremendous increase in motor vehicle tax income* replacing bond funds to a considerable degree, and at the same time contributing to the expanded road program.

Even more significant perhaps is the shift in the payment of state road costs from the general taxpayer to the motor user (see Fig. 1).

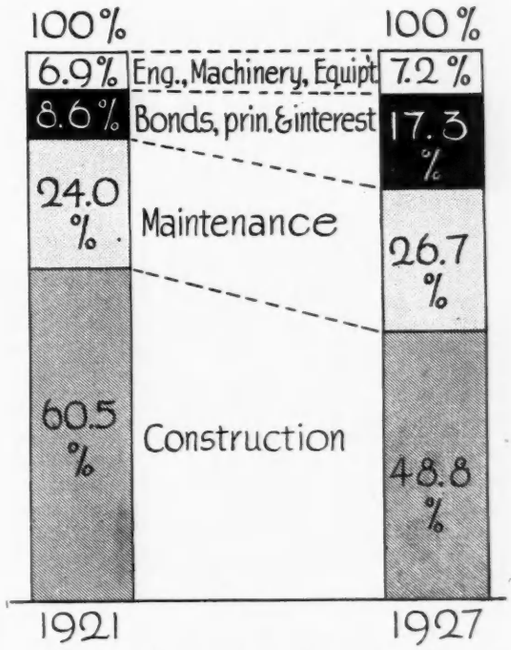


Fig. 3—Comparison of manner in which highway funds were expended, 1921 and 1927

The amount of state funds derived from general property tax and miscellaneous sources was $62,033,909. Relating this to the total of general tax receipts of the state ($798,100,000 exclusive of motor vehicle taxes) gives a figure of 7.8 per cent of general state taxes devoted to highways.

In the same manner $534,129,113 of county and local highway income was derived from general property taxes and miscellaneous sources. This indicates 12.2 per cent of the total of $4,382,000,000 local taxes was devoted to roads.

Since rail taxes go to the general tax funds they may be said to be applied to highways in the same proportion as general taxes, as follows:

Taxes		Per Cent of General Tax Monies to Highways	Rail Payment to Highways
Federal	$86,031,118	2.3%	$1,978,716
State	44,813,000	7.8%	3,495,414
Local	246,177,959	12.2%	30,033,710
Total	**$377,022,077**	**9.4%**	**$35,507,840**

As the total rural highway income amounted to $1,465,076,204 in 1927 the rail payments of $35,507,840 *were 2.4 per cent of the total.* Farm property pays 7 per cent of the income for state and local highways.

The 2.4 per cent of the road fund obtained from railroad taxes *compares with the figure of 35.2 per cent paid by the motor vehicle in registration fees and gasoline taxes alone.*

It should not be forgotten that the motor vehicle also paid personal property taxes in 36 states, municipal taxes and Federal excise taxes. The latter, however, were eliminated early in 1928.

There is no segregated record available of the general taxes paid on public and private garages, filling stations or of the other general taxes which are assessed upon all taxpayers alike such as the corporation and income levies.

TABLE 1—HIGHWAY INCOME

Source	1921			1927		
Bonds	$438,109,273		38.1%	$272,260,720		18.6%
Federal Aid	79,333,226		6.9%	80,459,671		5.5%
Motor Veh. Fees	118,942,706		10.6%	299,513,810[1]		35.2%
Gasoline Taxes	3,683,460			216,678,981[1]		
Gen. Prop. Taxes	415,681,010	36.2%	44.4%	527,122,830	36.0%	40.7%
Miscellaneous	93,681,221	8.2%		69,040,192	4.7%	
Total	**$1,149,430,896**		**100.0%**	**$1,465,076,204**		**100.0%**

(1) Excluding collection costs, diversions, etc.

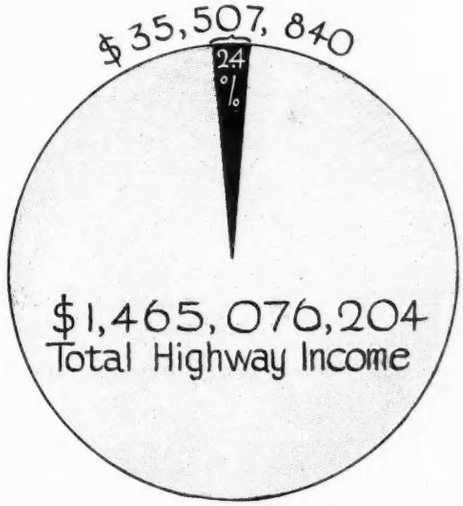


Fig. 4—The black segment in this chart represents the railroads' part of the total highway bill in 1927

New Developments—Automotive

Norton Floor Stand

NORTON CO., Worcester, Mass., offers a combination high speed floor stand that can be equipped with hoods for using either 24 in. or 30 in. wheels. Protection hoods accommodating either 24 in. or 30 in. wheels are furnished, as required. These hoods are overlapping steel boiler-heads, 3⅛ in. thick. They are hinged and movable to compensate for wheel wear, the movement being controlled by rack and pinion gears and a ratchet wrench. The hoods are locked in position by means of a cam and lever.

Adjustable combination spark deflectors and protection hoods for the operators are furnished. Wheel metal exhaust connections are stream-lined with the hoods. Work rests are supported from the base casting and are adjustable in two directions. Two double-row adjustable ball bearings are provided for the spindle.

Speeds are arranged to give 9000 s.f.p.m. for new wheels, and optional driving equipment can be furnished as follows:

1. Multiple (5) V-belts allowing three speed changes.
2. Silent chain with no speed change.

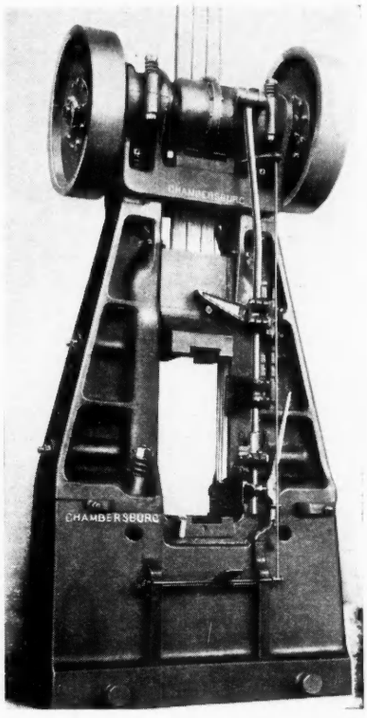
Any standard a.-c. or d.-c. motor can be accommodated on a hinged platform in the base. For 30-in. wheels 15 hp. motors are specified, and for 24-in. wheels, 10 hp. Lubrication of the entire machine is accomplished through four Alemite connections on the top of the base casting.

Norton floor stand grinder

Chambersburg Drop Hammer

CHAMBERSBURG ENGINEERING CO., Chambersburg, Pa., have recently developed a Model H board drop hammer in which quiet and frictionless operation has been obtained. The heat-treated alloy steel front rod operates between rollers with both ends of its stroke cushioned and a true sliding cam is used to actuate it. By removing the pull-back roller and pin and rolling the release lever from its bracket, the front rod is free to swing outward for the renewal of any part.

The wide anvil preserves the foundation and prevents rocking, while the rear of the hammer is clear of treadle connections and of any part whose function could be blocked by forgings or scale. The long frame feet have an I-beam section and are made without cores. Precise die adjustment without sacrificing guide clearance is made possible by the use of micrometer scaled forged steel adjusting wedges.



Chambersburg Model H Board Drop Hammer

The board rollers are mounted on large heat-treated alloy steel shafts, kept in parallel alignment by roller bearings. Large roll diameters give large contact area on the board, while destructive impact of the rolls on the board is prevented by the cushioned drop of the front rod. The forged steel adjustable guides permit a ready maintenance of proper ram clearance. Their wide spaces with three V's extending the full length of the stroke, prevent twisting and reduce lost motion due to wear.

Other new features of construction of this new hammer are: Large throw patented inter-lock eccentrics, patented full floating plate, and interlocking tie plates, forged steel rams, reinforced release lever, toggle mechanism always in tension, adjustable safety pedal and patented roller and safety lever.

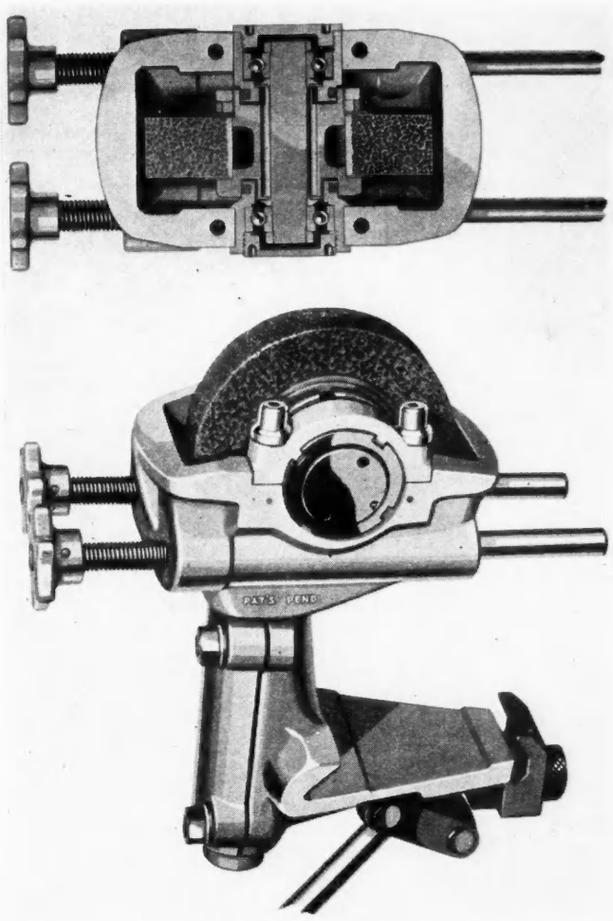
Ross Wheel Truing Tool

A NEW dresser for cylindrical grinding machines has been introduced by Ross Mfg. Co., 2209 Ashland Road, Cleveland, Ohio, which is said to result in reductions in wheel-truing costs and provide other advantages.

The ball bearing construction used in the hub design of this new tool permits the inner, instead of the outer, races to revolve, which results in a considerable decrease in ball speed, thus adding to the life of the bearings. Bearings are of the closed type and one bearing is fixed while the other floats with the object of eliminating internal strains. The distance between bearing centers is doubled to reduce the leverage of thrust loads of the grinding wheel against that of the dresser. The hub axle is made in one piece to gain freedom from vibration and distortion under load.

The dresser wheels may be replaced without disturbing the bearing assembly of the tool by removing four

Parts, Accessories and Production Tools



New Ross emery wheel truing tool for cylindrical grinding machines

hollow head nuts that secure the two bearing caps. The tool has two adjustable steady-rests, giving three-point support and enabling tilting to any desired shearing angle.

Dunlop "Silent" Tire

THE Dunlop Tire Co. in England has introduced a tire with a new tread design, which does not give rise to the usual noise associated with the majority of non-skid treads on some classes of road surface. Known as the "Silent" tire, it has already been adopted as original equipment by the makers of Daimler, Rolls-Royce and Lanchester Cars.

Dunlop "Silent" tire

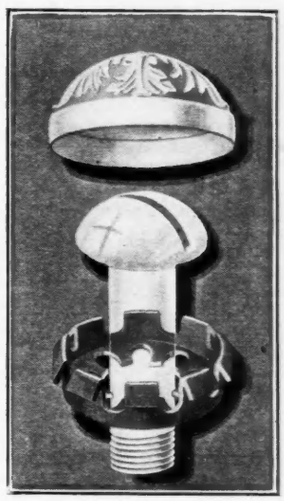
As seen in the accompanying illustration, the tread has no cross grooves, except at its extreme edges where are formed the buttresses supporting the walls. The central part of the tread consists of four circumferential grooves with corresponding ribs. It is not considered necessary to offer this type of tire except for luxury cars of which the owners consider tire "hum" as objectionable as a sound arising from any other source on the car.

AC Flame Arrestor

A DUAL air cleaner flame arrestor has been developed by AC Spark Plug Co., Flint, Mich., that is said to remove all hazards due to carburetor backfires from automobile engines. The device is attached to the intake of the carburetor and prevents dust particles from reaching the engine. The dust comes in contact with copper ribbons in the apparatus and adheres to the oil surfaces and is retained there. According to the report of the National Board of Underwriters no flame can be made to pass through the air cleaner flame arrestor under the most severe conditions.

Lockwasher Crowner

TO take care of the increasing demand for crowning bolt heads, screw heads and nuts on various assemblies, the Crowner Co. of New York, is bringing out what is called a Lockwasher Crowner that will enable manufacturers to lock the screw, seal it, and, if desired, include their trademark on or ornament the dome-type crowner, which is pressed over the lockwasher, thus protecting the washer and fastener against the elements. Another advantage is that the crowner can be put on after enameling the assembly, including the head of the screw or bolt and lockwasher.



Lockwasher Crowner

The spring steel lockwasher combines a multiplicity of inclined teeth to prevent the screw from reversing, and inverted rim spurs to engage a digging contact into the inside of the softer crowner material. This combination also functions as a seal for those who desire to control the servicing and repairs of their product. The new Lockwasher Crowner is being tooled up in 12 sizes to accommodate screws, bolts and nuts, from No. 3 screws to 7/16-in. nuts.

BY a Royal ordinance issued on Nov. 7 and published in the *Gaceta de Madrid*, the laws adopted to protect the industries for the manufacture of engines and automobiles in Spain are extended so as to also cover electric carts (carretillas electricas).

First with the News

Reliable, Accurate

News of the Industry

PAGE 140 VOLUME 60 *Philadelphia, Saturday, January 26, 1929* NUMBER 4

January Production High, May Reach 325,000 Units

PHILADELPHIA, Jan. 26—With retail sales continuing at a satisfactory rate, automobile plants are pushing production to a figure which may approach closely the all-time record for January output. It is estimated that around 325,000 passenger cars and trucks will be turned out during the month. This volume has been exceeded only once—in January, 1924, when the total was 330,000.

The factories feel that they are justified in starting off the year with high production schedules partly because of the encouraging sales reports that have been received from practically all parts of the country. Figures from 11 widely scattered states showed December sales to have been 53 per cent ahead of the same month last year. While new car stocks in dealers' hands still are somewhat above normal, latest reports indicate that the growth has been arrested.

Official Department of Commerce figures fix the total American and Canadian motor vehicle production in 1928 at 4,599,766. This compares with 3,579,753 in 1927, and with 4,505,861 in 1926, the next best year in the history of the industry. The Department of Commerce gives production for the month of December as 211,878 passenger cars and 30,682 trucks and buses, a total of 242,560 units.

Federal Screw Acquires Control of Lansing Firm

DETROIT, Jan. 22—Controlling interest in the Michigan Screw Co. of Lansing has been acquired by the Federal Screw Works of Detroit. Federal Screw has closed the largest year in its history, sales for 1928 amounting to $2,663,092, which compares with $1,591,688 in 1927. Earnings for 1928 were $402,597 before Federal taxes, compared with $198,901 in 1927.

Wisconsin-Timken Merge

DETROIT, Jan. 24—Stockholders of the Wisconsin Parts Co. meeting yesterday approved consolidation of that company with the Timken-Detroit Axle Co. No change in personnel of the Wisconsin company will be made. Willard Rockwell, president of the Wisconsin company, becomes a director of the Timken-Detroit company.

Price Reductions Made on Dodge Senior Six

DETROIT, Jan. 21—Price reductions ranging from $80 to $250 have been made on Dodge Brothers Senior Six model. The decreased prices were made possible by economies in production effected through cooperation with Chrysler Corp., according to C. W. Matheson, general sales manager. New and old prices in the models reduced follow:

	New Price	Old Price
Two-door sedan	$1,495	New Model
Coupe	1,545	$1,675
Four-door sedan	1,545	1,675
Landau sedan	1,595	1,845
Roadster	1,565	1,695

Roosevelt Price $995

INDIANAPOLIS, Jan. 25—The base price of the new Roosevelt straight-eight, which is to be introduced to the public soon by the Marmon Motor Car Co., will be $995 f.o.b., according to an announcement by G. M. Williams, president of Marmon. The car will be exhibited to dealers at the Auditorium Hotel, Chicago, during the show next week.

The car will be the lowest-priced straight-eight on the market. The L-head engine has a bore and stroke of 2¾ by 4¼ in., giving a piston displacement of 201.9 cu. in., and develops 70 hp. at 3200 r.p.m. S.A.E. rating is 24.2 hp. Complete specifications have not been released.

Warner to Split Stock

DETROIT, Jan. 24—Directors of the Warner Aircraft Corp. yesterday approved a ten-for-one split-up of the company's stock, subject to approval of the Michigan Securities Commission. This will bring the outstanding stock to 350,000 shares.

Production in 1928 Is 4,599,766 Units

1928

	Cars	Trucks	Total
Jan.	212,351	27,840	240,191
Feb.	301,466	34,834	336,300
Mar.	387,044	43,752	430,796
Apr.	385,394	48,921	434,315
May	405,627	54,098	459,725
June	381,963	43,232	425,195
July	358,914	58,388	417,302
Aug.	424,867	67,676	492,543
Sept.	375,444	61,034	436,478
Oct.	352,992	62,640	415,632
Nov.	225,410	43,294	268,704
Dec.	211,878	30,682	242,560
Total	4,023,350	576,416	4,599,766

G.M. Denies Report of Opel Purchase

DETROIT, Jan. 23—General Motors knows nothing about reports that are being circulated in newspapers to the effect that it has acquired 51 per cent of the shares of the Opel Works of Germany, an official of the corporation stated today. It was added that several parties of General Motors executives are in Europe on other business for the corporation.

Newspapers today quoted the Cologne Kolnische Zeitung as saying that despite denials General Motors had acquired 51 per cent of the shares of the Opel Company at about 120,000,000 marks, while the balance remained in the possession of the Opel family.

Stock Company Organized

WASHINGTON, Jan. 24—The Opel Works of Berlin, Germany, which has been the personal property of the Opel family, has just been organized into a stock company to be known as the Opel Atkiengesellschaft, the department of commerce has been informed. The capital stock, consisting of 60,000 shares with a value of 10,000 marks each, is almost entirely owned by the Opel family, says the report.

Wolfers Joins Lee Anderson

DETROIT, Jan. 21—Robert Wolfers, well-known in automotive publishing and advertising circles, has become associated with Lee Anderson Advertisers, Inc.

Executive Changes Are Made in Stutz

F. E. Moskovics Retires—E. B. Jackson, Chairman of Board—E. S. Gorrell, President

NEW YORK, Jan. 24—At a meeting of the board of directors of the Stutz Motor Car Co. of America, Inc., held today, F. E. Moskovics, president of the company, tendered his resignation.

E. B. Jackson, vice-president, was elected chairman of the board with headquarters in Indianapolis.

E. S. Gorrell, vice-president, was elected president.

The executive committee now consists of the following members: E. B. R. Thayer, Charles Reed and Mr. Jackson.

Mr. Moskovics, retiring president of Stutz, is a well-known personality in the automotive industry. He became widely known while vice-president in charge of sales and promotion of the Nordyke & Marmon Co., with which he first became associated in 1914. Previously Mr. Moskovics was sales manager of the Remy Electric Co. with headquarters at Anderson, Ind., and prior to that he was a leading figure in the bicycle business.

For a number of years, Mr. Moskovics has been prominent in the activities of the Society of Automotive Engineers. He is chairman of its constitution committee which has proposed a number of changes in the organization of the Society that are now being considered. He is also a member of the National Technical Committee of the A.A.A.

Mr. Jackson joined the Stutz organization as vice-president in charge of the eastern territory in December, 1928. His automobile experience dates back to the early days of the industry, when, in 1902, he became advertising manager of the old Searchmont Automobile Co., with headquarters in Philadelphia. Later on he took charge of Wanamaker's automobile department in New York, when Wanamaker was merchandising Ford cars. Leaving Wanamaker, he joined the Packard Motor Car Co. in New York and then took charge of the Packard branch in Philadelphia. Subsequently he became president of the New York Packard company. After 10 years with Packard he was appointed vice-president in charge of sales of the Willys-Overland Co., and left that position after serving five years to take charge of Wills Sainte Claire sales in New York. When Wills Sainte Claire experienced financial difficulties he sold his New York company and became associated with W. C. Durant in the Locomobile Co. of America.

Mr. Gorrell, the new president, has been an executive of Stutz since his appointment as a vice-president early in September, 1925. Shortly afterward he became a member of the board of directors. Before joining Stutz he was vice-president of the Nordyke & Marmon Co.

He is a graduate of West Point and the Massachusetts Institute of Technology. Much of his early experience was gained in the aeronautical field. He took up flying in 1914 and was an Army aviator in 1916 with the Mexican Punitive Expedition. During the World War he was placed in charge of aeronautical engineering of the American Expeditionary Forces in Europe and was later chief of staff of the air forces. For his war services he received American, British and French decorations.

Entering the automobile business after the war, Mr. Gorrell attracted notice by his success as a distributor on the Pacific Coast and in New England, and his knowledge of dealer problems, coupled with his engineering experience, led to his connection with Marmon, and later with Stutz.

Executive Changes in Stutz

F. E. Moskovics
Retiring President

E. B. Jackson
New Chairman of Board

E. S. Gorrell
New President

Detroit Show Attendance is 70,000 in Three Days

DETROIT, Jan. 23—During the first three days of the Detroit Automobile Show, which is being held in Convention Hall, the attendance was approximately 70,000. Besides the show, which is regarded as the largest exhibit sponsored by automobile dealers, the week has been the occasion for several dealers' meetings.

The Michigan Automotive Trade Association held its convention today, the principal speakers including A. V. Comings, of the Chilton Class Journal Co.; Capt. E. V. Rickenbacker, of the Cadillac Motor Car Co., and James Dalton, of Motor Period. Chevrolet Motor Car Co. held a meeting for 1100 of its dealers also today. The speakers included C. F. Ketterling, vice-president of General Motors Corp., B. G. Koether, director of the sales section of General Motors; Charles T. Fisher, Alfred J. Fisher, H. J. Henderson and C. F. Barth, vice-president of Chevrolet.

Chicago Show Opens With 532 Exhibits

CHICAGO, Jan. 26—Today will see the opening of the twenty-ninth annual National Automobile Show in the Coliseum at Chicago. It has been billed as a $5,000,000 exposition, with 300 new models of automobiles listed for display and 150 exhibits of accessories and 82 of shop equipment scheduled. As a background, the Show is to have a $90,000 decorative and lighting effect.

On the main floor of the Coliseum and in the north and south halls will be seen the 1929 offerings of American motor car manufacturers. The mezzanine floor is to be the scene of accessory and shop equipment displays. A detailed schedule of numerous meetings, luncheons and dinners to be held in Chicago in Show week will be found on page 147 of this issue.

Newton Steel to Build Large Plant in Michigan

NEWTON FALLS, OHIO, Jan. 19—Plans for a large expansion by the Newton Steel Co. of this city, at Monroe, Mich., which will cost between $3,000,000 and $5,000,000, have been announced by John Fitch, vice-president in charge of operation. Newton Steel has bought 500 acres at Monroe with good railroad and water connections and construction will begin at once, it was officially stated.

The expansion is part of a program that will ultimately represent an expenditure of $30,000,000. The company makes full finished sheets used in automobile body construction.

Fishers Interested in Skelly

NEW YORK, Jan. 24—That the Fisher brothers have recently bought into the Skelly Oil Co. is revealed in the announcement that Clarence Bitting, managing director of Fisher & Co., has been elected to the Skelly board of directors.

Steel Mills Report Favorable Business

No Price Changes Expected to be Caused by Proposed Tariff Schedules

NEW YORK, Jan. 24—Although there have been some complaints that a few automotive consumers are not taking steel in as large tonnages as had been expected, the movement of material into automotive consumption continues generally very satisfactory. Considerable informality prevails in some lines with reference to fresh buying. This is especially true of full-finished automobile sheets. The supposition is that all steel is contracted for in round tonnages in advance, and that buyers then draw on their contracts, furnishing specifications and shipping orders as steel is needed for their own operating schedules.

Where there prevails perfect agreement as to price between seller and buyer, as is the case just now in the market for full-finished automobile sheets, it happens, however, that a good many specifications are received and accepted without the formality of previous contracting, or it may be said that there is a good deal of buying in which contracts and specifications are received together. The fact is that full-finished sheet mills receive a constant addition to a very satisfactory backlog of business, and that shipments are maintained at a rate commensurate with production.

Hot-rolled strip mills also have sufficient business on their books to keep them busy throughout February. In some cases business went to those mills in a position to guarantee earliest delivery. Cold-rolled strip mills are also in a satisfactory position with reference to the volume of business on their books. Demand for cold-finished steel bars and automotive alloy steels is fair. Prices are steady all along the line. In view of the backwardness of demand from most other consuming lines, the contrast furnished by automotive consumption is decidedly encouraging to the steel industry.

The general impression is that prices will in nowise be affected by whatever changes may be made in the iron and steel schedules of the proposed new tariff, demand for additional protection being asked rather by way of forestalling foreign competition than of having to overcome any now confronting the American steel industry.

Pig Iron—Quite a few automotive foundries are drawing heavily on their first quarter contracts, but so far very little is said about second quarter requirements. The market is a shade more active, with Valley iron competing actively with Lake furnaces in parts of the Middle West. Prices are unchanged.

Aluminum—An authority places last year's production of aluminum pistons at 20,000,000 pounds. The gradually increasing volume of aluminum piston scrap is causing some readjustment in the scrap market. In some cases, remelters specify that their purchases must not contain more than a certain small percentage of piston scrap, and in others buyers bid 2 cents per pound less for pistons than for sheet and cast, the reason being that the alloy content of pistons causes considerable loss in melting. The market for virgin metal is unchanged.

Copper—Tight conditions in the supply continue. A large Lake producer shipped 1,500,000 pounds by rail to Detroit, the largest single rail shipment ever made out of the district, and indicating the sold out condition of the Lake producers. Demand for automotive brasses is good.

Tin—A New York brokerage house calls attention to the annual shutdown of the Straits smelters which occurs in February or March and usually lasts a fortnight, and which may result in diminished shipments during these months. The market, for the present, continues fairly easy.

Lead—The market is quiet and unchanged.

Zinc—Consuming demand is light with prices unchanged.

Heads U. S. Rubber

F. B. Davis, Jr.

Whose election as president and chairman of the board of the United States Rubber Co. was announced in Automotive Industries last week. He has long been identified with the duPont interests

Davis Motor Sells Assets

RICHMOND, IND., Jan. 19—George W. Davis Motor Car Co. of Richmond has sold its former name, its trade mark "Davis" as applied to automobiles and certain portions of its manufacturing plant and all its inventory and machinery to the Automotive Corp. of America, Baltimore. For this reason the company has selected the name G. W. Davis Corp. in retaining the rest of its assets. It is understood that the new owner intends bringing out a new car under the Davis name at the Richmond plant.

Business in Brief

***Written by the Guaranty Trust Co., New York, exclusively for* AUTOMOTIVE INDUSTRIES.**

NEW YORK, Jan. 24—Retail trade in most sections of the country during the last week has been benefited by the cold weather. This is especially true in the West, while temperatures in the South have been too high for any marked stimulation in trade. Wholesale trade has also active.

CHAIN STORE SALES

Sales of eighteen leading store chains during December amounted to $157,001,755, a new high record for the year, as compared with sales of $139,268,612 reported for December, 1927. Total sales of the same store chains during 1928 amounted to $991,824,057, as compared with sales of $864,807,571 during 1927.

CONSTRUCTION REPORT

The volume of construction during 1928 was the highest in the history of the country, according to a report issued by the F. W. Dodge Corp. Contracts drawn up in that year for new building and engineering projects in the 37 states east of the Rocky Mountains represented a value of 6,628,286,100.

FREIGHT CAR LOADINGS

Car loadings for the week ended Jan. 5 totaled 798,723 cars, which marks an increase of 131,137 cars above those in the preceeding week and an increase of 44,476 over those in the corresponding week in 1928.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended January 19 was 97.2, which compares with 97.1 the week before and 97.0 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended January 16 were 9 per cent above those a year ago.

STOCK MARKET

The stock market in the earlier part of last week was highly irregular, with a corresponding irregularity in the call money rate, which rose to 9 per cent on Tuesday. However, in the latter part of the week call money fell to 6 per cent; and, with the easing of money, the market gained strength and registered some brisk advances.

FEDERAL RESERVE REPORT

The consolidated statement of the Federal Reserve banks for the week ended Jan. 16 showed decreases of $54,700,000 in holdings of discounted bills and of $900,000,000 in holdings of Government securities, while there was an increase of $4,100,000 in holdings of bills bought in the open market. The reserve ratio on Jan. 16 was 67.0 per cent, which compares with 66.3 per cent the week before.

Buick Engineering Fills New Building

Four-Story Structure is Fully Equipped With Experimental Apparatus

DETROIT, Jan. 19—The engineering department of the Buick Motor Co. has moved into its new building at Flint which is said to be one of the most completely equipped of its kind in the industry. A total of 82,000 ft. of floor space is contained in the new building which is four stories tall. Offices of department executives are on the fourth floor. On this floor also is a large drafting room, fitted with every known mechanical aid, including a battery of 1000-watt lamps in indirect lighting fixtures.

The third floor houses technical records, a complete engineering library, chart room, photographic and blue print departments, a sheet metal experimental department and a competitive car department, where other makes of automobiles undergo close scrutiny. An enormous cast-iron bedplate is provided to insure the utmost accuracy in tests.

On the second floor is an experimental machine shop, fitted with apparatus for experimental work on transmissions, axles and engines. An outdoor auxiliary display space is provided for making color comparisons in daylight.

The ground floor houses a battery of dynamometers for engine tests, each in a separate soundproof room, and study of the effects of the various temperatures upon the automobile mechanism has been carried to the ultimate developments in the cold room. Space is provided not only for testing an engine in any temperature between 120 degrees above and 20 degrees below zero Fahr., but also for observing the effect of cold upon the car performance as a whole. A chassis dynamometer built into the cold room is the feature which makes this possible.

A large blower, which may be operated so as to send a 50-mile gale through the pipes which cool this room, still further extends the possibilities of studying weather's effects upon cars.

Roamer at Chicago Show

DETROIT, Jan. 26—Roamer Consolidated Corp. is exhibiting at the Chicago Show its two lines of Straight Eights, the series 120 and series 8-78. Prices on the two lines have not been announced but the 8-78 is stated by A. C. Barley, president of the Roamer company, to be about the same as last year while the 120 prices represent a reduction from last year's corresponding model. Four body types will be available on both chassis although only a five-passenger sedan is exhibited at Chicago on the 120. The 8-80 has been dropped.

Plan English Race for Standard Cars

LONDON, Jan. 19—At Brooklands Track May 10 and 11, a double twelve-hour race will be run, confined to standard production models of what are known as sports, super-sports and speed types. Any car entered must be of a model scheduled for production, offered for sale in a catalogue issued prior to this date and must carry full equipment including windshield, folding top and fenders. Besides the first prize of $5,000 numerous other awards will be given to the leaders at 6, 12 and 18 hours respectively.

Says Foreign Sales Made 135,000 Jobs

NEW YORK, Jan. 19—Improved employment in all parts of the world is being created by the growth of motor transportation, in the opinion of George F. Bauer, Export Secretary of the National Automobile Chamber of Commerce, who spoke before the annual banquet of the Overseas Automotive Club this week.

"Employment is created for one man by every six cars put into use," said Mr. Bauer. "As a result of the 810,000 motor vehicles of American design bought by foreign countries in the past year, 135,000 jobs were created. This figure is based on experience in the United States, where more than 4,000,000 persons are employed in motor transportation in selling, servicing, highway building, and related activities."

Estimate 250,000 Sales for New England in Year

BOSTON, Jan. 19—Based upon registrations of new cars in New England during 1928 these six states may reasonably be expected to absorb 250,000 new models this year, according to the estimates of several distributors. Of this number Massachusetts may be put down for 125,000, or 50 per cent. Last year throughout New England the sales of new cars reached 214,660, with 110,968—more than half—sold in the Bay State. In 1927 the figures were 181,163 new cars of which 88,183 were Massachusetts cars.

Moves Studebaker Offices

LOUISVILLE, KY., Jan. 19—G. Breaux Ballard, president of the Studebaker Sales Co. of Kentucky, has moved the sales and executive departments from an old and temporary location to a new building, erected for the company requirements.

Eastern Companies Viewing California

De Vaux of Durant Urging Four Concerns to Choose Oakland Factories

OAKLAND, CALIF., Jan. 21—Four Eastern automobile manufacturing companies are looking to this city as a location for branch factories in 1929, according to Norman De Vaux, head of the Western plant of the Durant Motor Co., here.

Mr. De Vaux has left for the East, accompanied by George R. Scott, assistant general manager of the Durant company here, to encourage officials who have the decisions to make to choose Oakland as the place for factory branches. George R. Norris, sales manager; E. S. Jones, assistant sales manager, and other officials of the company will labor from here to help bring about the desired result.

The four companies have determined to build on the Pacific Coast this year, Mr. De Vaux says, and he believes they can be shown that Oakland offers the greatest advantages. He said the Western plant of the Durant company plans to turn out 30,000 motor cars and trucks this year, as compared with 20,000 produced in 1928.

De Vaux explained his attempt to bring rival manufacturers here by saying: "What helps Oakland or the Pacific Coast helps all of us."

Curtiss and Caproni Organize New Company

NEW YORK, Jan. 19—Curtiss Aeroplane & Motor Corp. and the Societa Aeroplani Caproni of Milan have organized a company to manufacture the Caproni plane in this country, according to an announcement by C. M. Keys, president of the Curtiss company, after a series of conferences with Gianno Caproni.

The company, Curtiss-Caproni, Inc., has been formed with an issue of approximately 400,000 shares outstanding, for construction under the rights of the Italian organization.

Mr. Caproni designed and built many of the giant bombers made by the Allies during the war and has since devoted himself to the design and construction of huge commercial planes.

Nehrbas Heads Chamber

EVANSVILLE, IND., Jan. 19—F. P. Nehrbas, vice-president and general manager of Servel, Inc., which includes Hercules Products, Inc., manufacturers of Commercial car bodies, has been elected to head the Evansville, Ind., Chamber of Commerce in 1929. Mr. Nehrbas came here three years ago from Indianapolis, where he was assistant general manager in charge of manufacturing for the Stutz Motor Car Co. of America, Inc. He has spent 27 years in the automotive field.

Men of the Industry and What They Are Doing

Whitney Made Director of Federal Drop Forge

Stockholders of the Federal Drop Forge Co. of Lansing, have elected J. Ross Whitney, secretary, to the board of directors to fill the vacancy caused by the death of J. P. Hopkins. All members of the board were reelected as follows: M. R. Carrier, R. G. Carrier, H. B. Lundberg, H. F. Harper, C. E. Bement, H. C. Teel and J. R. Whitney.

Wiles Leaves Budd

C. L. Wiles has resigned as factory superintendent of the Budd Wheel Co., where he has been connected for the past nine years, and has become factory superintendent of the Michigan Steel Casting Co., Nelson Wheel Division, who will manufacture a new type steel spoke dual wheel.

Coapman on Crime Committee

C. Walter Coapman, assistant treasurer of the North East Electric Co., has been named by Newton D. Baker, former Secretary of War under President Wilson, as a member of a special committee of the National Crime Commission to study payroll robberies. Mr. Baker is chairman of the commission.

Barnes Promotes Buckingham

F. Martin Buckingham has been transferred from the Wallace Barnes Co., Bristol, Conn., to Hamilton, Ont., where he has assumed his duties as general manager of the Wallace Barnes Co., Ltd. A new addition to this plant is just being completed which practically triples its floor space and capacity.

G.E. Appoints Two Managers

H. L. R. Emmet has been appointed manager of the Erie (Pa.) works of the General Electric Co., and J. E. Brobst has been named manager of the Bloomfield (N. J.) plant, succeeding Matthew Griswold at Erie and C. D. Knight, at Bloomfield, both of whom retired, because of ill health.

Rumely on Australian Trip

Leo M. Rumely, vice-president and general manager of General Motors Export Co., sailed from Vancouver Jan. 9 for Australia for a four months' visit to the five General Motors plants in Australia and also General Motors New Zealand, Ltd., Wellington.

Alexander Appoints Cardway

Alexander Aircraft Corp., division of Alexander Industries, Inc., Colorado Springs, Col., has appointed Col. Fred Cardway as vice-president. Colonel Cardway, who handles much automotive overseas business, will have complete charge of the international activities of the Alexander company. The Alexander company, according to Colonel Cardway's announcement, plans to build 1000 planes during 1929.

Directs Tire Sales

Girard Hammond, who has been appointed general sales manager of Dunlop Tire & Rubber Co. of Buffalo. He was formerly an executive with Batten, Barton, Durstine & Osborn, Inc., New York advertisers

Goodyear Makes Promotions

Goodyear Tire & Rubber Co. has appointed J. E. Mayl, manager of the Southern division. Mr. Mayl, who was formerly manager of the truck tire sales, succeeded C. W. Martin, Jr., who has been granted a leave of absence. E. R. Preston, formerly assistant manager of truck tire sales, succeeds Mr. Mayl as manager of the truck tire department. K. A. Dalsky is assistant manager.

Seymour General Manager

Capt. Lester D. Seymour, formerly chief engineer and assistant general manager of National Air Transport, Inc., has been promoted to general manager. Captain Seymour succeeds Colonel Paul Henderson who remains as active vice-president and who also is vice-president of Transcontinental Air Transport.

Grant on Pacific Coast

R. H. Grant, vice-president of the Chevrolet Motor Company, in charge of sales, is holding a series of dealers' meetings at various Pacific Coast cities.

Butler Willys-Overland Pacific Coast Manager

R. L. Butler has been appointed regional manager for the Pacific Coast for Willys-Overland, Inc., with headquarters at San Francisco. He goes there from Toledo, Ohio, where he was branch manager, and has been factory representative in different sections, district manager at Toledo and division manager at Moline.

Oakland Appoints Newcom

J. Scott Newcom has been appointed acting manager of the San Francisco District of the Oakland Motor Car Co. Mr. Newcom formerly was assistant district manager in Pontiac, and succeeds to the managership made vacant when H. P. Grove, formerly district manager, was sent to Los Angeles as district manager of the new field headquarters created there on Jan. 1.

G. D. Simonds Joins F.W.D.

G. D. Simonds, formerly with the Graybar Electric Co. as tool sales engineer, is now sales engineer for the Four Wheel Drive Auto Co. Mr. Simonds will be located in New York City and will devote his attention to the development and sale of FWD public utility trucks and equipment.

Schwab Succeeds McPhee

The Louisville assembly division of the Ford Motor Co. is in charge of P. W. Schwab, formerly manager at the Houston (Tex.) division, succeeding Edward L. McPhee, who resigned to take over a Ford agency at Roanoke, Va.

Dudgeon Joins Spinning

W. C. Dudgeon, for the past 12 years connected with national advertising agencies in New York, Chicago, St. Louis and Detroit, has joined Rolfe C. Spinning, Inc., Detroit advertising agency, in the capacity of vice-president.

McKay Oakland Manager

A. R. McKay has been appointed manager of the Oklahoma City district of the Oakland Motor Car Co. Mr. McKay succeeds Z. R. Kirkpatrick, who has been promoted to the managership of the Southwestern Regional office at Kansas City.

Risley Leaves Craveroiler

Capt. Dalton Risley, Jr., has resigned as general manager of the Craveroiler Co. of America. His future plans will be announced about Feb. 1. Capt. Risley is succeeded as general manager by N. R. Norman.

G.M. Truck is Host to 100 Suppliers

Company to Spend $2,000,000 for Advertising in 1929, Official Announces

PONTIAC, Jan. 19—"General Motors Truck Co. does not believe in squeezing its suppliers down to the last notch," Paul Seiler, president, General Motors Truck Co., told a group of over 100 parts makers and suppliers who were guests of his company here today. The supplier, Mr. Seiler emphasized, is one of the most important elements in any manufacturer's setup. He voiced the firm belief that manufacturer and supplier get along much better when they understand each other's problems thoroughly and stand on a common ground

The parts and supply executives were taken through the entire General Motors Truck plant and listened to brief talks outlining the policies and plans of the company by Louis Ruthenburg, vice-president, and H. J. Warner, assistant to the president, as well as by Mr. Seiler. A visit to the General Motors proving ground completed the meeting.

General Motors Truck Co. will spend $2,000,000 in advertising during 1929, Mr. Warner said, with just one main idea—that of increasing its dealer and distributor outlets. Last year the organization built nearly 29,000 vehicles, of which about 7000 were marketed abroad. In 1929 total sales are estimated at 40,000, of which foreign markets are expected to absorb about 12,000. The dealer and distributor organization has been increased from 900 to 1400 in the last nine months, Mr. Warner stated. He added that the Yellow Mfg. Acceptance Corp. had financed $15,000,000 worth of sales last year.

Materials and supplies purchased by the company last year amounted to $27,278,722.

Will Run 13 Auto Shows in Foreign Countries

PARIS, Jan. 19—Thirteen European shows and exhibitions have been approved by the International Bureau Permanent of Automobile Manufacturers as events in which manufacturers are authorized to take part. They are as follows: Rome, Jan. 30 to Feb. 10; Utrecht Fair, Feb.; Helsingfors, end Jan. to beginning Feb.; Cairo, Feb. 6 to 16; Copenhagen, Feb. 2 to March 3; Vienna Samples Fair, March 10 to 17; Geneva, Switzerland, March 15 to 24; Milan Fair (commercial vehicles only), April 12 to 27; Barcelona Exhibition, May to Nov.; Budapest, opening May 19; London (passenger cars), opening Oct. 17; Berlin (passenger cars), opening Nov. 14; Brussels, opening Dec. 7.

Automobile manufacturers are not authorized to take part in the British Industries Fair at London and Birmingham, the Graz Fair, Austria, nor the Hispano-American Exhibition at Seville.

Boeing Increases Stock

NEW YORK, Jan. 21—Stockholders of Boeing Airplane & Transport Corp., Seattle, have voted to increase authorized cumulative preferred stock from 200,000 shares to 1,000,000 shares and authorized common stock from 650,000 shares to 2,500,000 shares. This increase in capitalization is a part of a recently announced plan to organize United Aircraft & Transport Corp., merging the Boeing interests with Pratt & Whitney Aircraft Co. and Chance Vought Corp.

Auto-Lite Future Bright

TOLEDO, Jan. 21—C. O. Miniger, president of the Electric Auto-Lite Co., has predicted the largest business era in the history of his company during the coming year. The firm will start delivery of the 1,000,000 generators to be supplied this year to the Ford Motor Co., on Feb. 1. Output will start at 1000 on that date, it is said, and will be increased 250 daily until the daily production schedule reaches 4000.

Solid Tires Outlawed

WASHINGTON, Jan. 24—Use of solid tires on motor vehicles is prohibited under a law recently passed by the Canton of Tessin, Switzerland, the Department of Commerce has been advised. Only vehicles equipped with pneumatic tires can obtain licenses.

Crude Rubber Closes Steady

NEW YORK, Jan. 21—The crude rubber market registered a marked reaction from the high point of the week but closed fairly steady, according to F. R. Henderson Corp. Stocks in London increased to 23,016 tons and arrivals in New York from January 1 to 19 are estimated at 34,700 tons.

La France Working Overtime

BLOOMFIELD, N. J., Jan. 19—American La France and Foamite Industries, Inc., announces that its plant here has been working overtime for the past two months in getting out 225 trucks for the Street Cleaning Department of New York City. Orders totaling 258 trucks and flushers have been received from the various boroughs of the city.

Martin-Parry Reports Loss

NEW YORK, Jan. 21—Martin-Parry Corp. reports net loss for the quarter ended Nov. 30, 1928, the first quarter of its fiscal year, as $37,653. Net sales amounted to $793,500.

Brown & Sharpe Moves Office

PROVIDENCE, R. I., Jan. 19—Brown & Sharpe Mfg. Co. announces that beginning Feb. 1 its Philadelphia office will be located at 1102 Elverson Building, Broad and Callowhill Sts.

Financial Notes

Commercial Credit Co. reports total business handled during 1928 as approximately $270,000,000. While final figures for December have not yet been tabulated, the net income applicable to common stock after all charges will be approximately $4 a share. Earnings in 1927 were $1,828,471, or $1.04 a share, on total stock outstanding.

American Motor Transportation Co. has called for redemption on February 15 all its outstanding 20,000 shares of Class A cumulative convertible $3.50 preferred stock. Call price is $55 per share and accrued dividends.

National Aviation Corp. reports net earnings for the first six months of operation from Jan. 23 to Dec. 31, 1928, as $331,017, equivalent to $2.20 a share on outstanding stock.

McCord Radiator & Mfg. Co. has declared regular quarterly dividend of 50 cents on Class B stock payable February 1 to holders of record January 26.

General Tire & Rubber Co. has declared regular quarterly dividend of $1 payable February 1 to holders of record January 20.

Willys-Knight Speeding Output to 2000 Daily

TOLEDO, Jan. 19—Production of the new line of Whippet and Willys-Knight cars is rapidly being stepped up to plant capacity of 2000 cars a day to meet the influx of orders that immediately followed the initial showing of the new line, officials of the Willys-Overland company stated here today. Thursday's production of 1671 cars was the largest daily output since the new models went into production.

Present indications are that January sales may double those of the previous highest January in the company's history and every effort is being made to reach capacity production as speedily as possible to keep pace with incoming orders.

To Make Isotta Engines Here

NEW YORK, Jan. 19—Isotta-Fraschini airplane engines are soon to be manufactured in the United States, Enea Bossi, American licensee for their production, has announced. Mr. Bossi, who is president of the American Aeronautical Corp., has explained that all types of aviation engines, from the 80 hp. six-in-line air cooled product to the 1000 hp. water-cooled giant 18-cylinder engine, will be included in the plan of production.

Citroen Schedules 10,000

WASHINGTON, Jan. 24—Societe Andre Citroen intends to increase monthly producton from 8,000 to 10,000 units during 1929, according to the annual report of the Paris automobile manufacturing concern received by the Department of Commerce.

13 Per Cent Sales Increase is Shown

Cincinnati Auto Dealers Are Hopeful Over Results in Early January

CINCINNATI, Jan. 23—With January registrations for the first 15 days, showing an increase of 32 per cent over the same period last year, motor car dealers are confident that a steady demand will continue through what ordinarily are considered the lean months.

An increase of 14.5 per cent in new car sales and 13 per cent in used cars during 1928 over the previous year is gratifying to dealers, and the fact that increases were shown throughout the last quarter of last year and are continuing in comparative ratio this month, is regarded as a most hopeful sign.

The report of the Ohio Council, National Automobile Dealers Association, showing December sales of new cars in the nine most populous counties in Ohio, shows quite a shift in the relative standing of makes. Of 9220 sales, Ford was first with 3464, outdistancing Chevrolet, which had been either first or second for a number of months. The order of other makes follows:

Whippet, second, with 676 sales; Chevrolet, third, 627; Essex, fourth, 491; Dodge, fifth, 336; Buick, sixth, 324; Nash, seventh, 291; Pontiac, eighth, 274; and Chrysler, ninth, 230.

Plan 42-Passenger Bus With Two Steam Engines

INDIANAPOLIS, Jan. 24—Automotive Syndicate, Ltd., has been organized here to design and build a pre-manufacturing model of a 42-passenger motor bus powered by steam. The system comprises two steam engines, a main engine with eight cylinders and poppet valves, which is described as of the semi-uniflow type, and a small auxiliary steam engine for driving the electric generator, condenser fans and air compressor. The steam generating units, said to be of new design, are located at the rear of the vehicle and are non-explosive.

Oil is used as fuel. The main engine is located under the floorboards, amidships, and drives directly to twin-worm-gear rear axles. Westinghouse air brakes are fitted and the bus doors are air-operated from the driver's seat.

The main condensers are located at the front of the bus, while auxiliary condensers are located on the roof. All operating units are below the floor level and are arranged for quick replacement in service.

The active officials of Automotive Syndicate, Ltd., include W. J. Parrish, general manager, and George M. Dickson, treasurer.

Greenfield Employing 1100

GREENFIELD, MASS., Jan. 21—Greenfield Tap & Die Corp. is maintaining a high rate of production with the machine tool division working overtime. About 1100 persons are now employed, 200 more than a year ago, and prospects are bright for business in the various lines with sales to the automotive industry exhibiting an exceptional gain.

Reject Feed Patent Part

WASHINGTON, Jan. 24—The Patent Office has granted a patent to Andre C. Attendu for his invention of a fuel feed for Diesel type internal combustion engines but has rejected an important claim pertaining to his part of the apparatus comprising an injector line, a fuel chamber, a measuring pump, and means for maintaining a predetermined pressure in the chamber and injector line by an adjustable relief valve. This was held as anticipated in a previous patent.

Fageol Announces $125,000 Extension

Capacity Nearly Doubled as Increased Production for Four Years Seen

OAKLAND, CALIF., Jan. 21—A big expansion program in which its plant here will be nearly doubled at a cost of $125,000 is announced for 1929 by the Fageol Motors Co. of Oakland to accommodate the increase in its production anticipated for the next four years.

A building erected last year is being given an addition which will be used for the machine shop. When completed it will measure 100 by 100 ft. The equipment required in altering the shop has been built in and a 100,000-gallon water tank, declared to be the second largest on the Pacific Coast, is being installed as part of the new sprinkler system.

The company's officials state their coach and truck sales increased 50 per cent during the past year and they expect fully as great an increase in 1929. A new truck model, termed the "Cub," with a capacity of one ton, to its line of trucks, which will give the company representation in all classes of trucks.

The firm also has added to its territory served by taking in Japan, Java and Mexico. Thus Fageol trucks and coaches will now be distributed in the 11 Western States of this country and in Mexico, Central and South America, Hawaii, Australia, the Philippines, the East Indies and the Orient.

The company's officers include L. H. Bill, president; James H. Fort, vice-president and sales manager, and Theodore R. Bill, assistant sales manager.

Warner Aircraft Plans Output of 1000 Engines

DETROIT, Jan. 22—Warner Aircraft Corp. reports estimated earnings for the 1929 fiscal year between $15 and $20 per share on the 35,000 shares of no par capital stock outstanding. The company, which is about a year old, makes a seven-cylinder, 110-hp. radial engine.

"Our original production program for the 1929 fiscal year called for 500 motors," President W. O. Warner, in commenting on 1929 schedules and plans, said. "However, the reception accorded our product during the past year by various airplane manufacturing concerns has been so far in excess of our anticipation that we have unfilled orders for nearly 2000 engines, far in excess of our capacity for the year. Our original schedule will be doubled to 1000."

The board of directors is composed of Charles Bohn, Bohn Aluminum & Brass Corp.; William B. Stout, Stout All-Metal Aircraft Corp.; William B. Mayo, chief engineer of Ford Motor Co.; W. O. Warner, W. M. Jones, Newton Skillman and E. N. Hartwick.

Philadelphia Buses Operating on Fuel Oil From Standard Carburetor at Large Saving

PHILADELPHIA, Jan. 25—Fuel oil is being burned successfully in 20 Philadelphia Rapid Transit gas-electric buses and before the end of the present year the entire fleet of 580 gas-electrics will be operating on this cheap fuel, according to J. A. Queeney, vice-president of operation of Mitten Management, Inc., who spoke before a meeting of the Engineers' Club here this week.

A system of carburetion has been developed which enables an engine to start on fuel oil, without any preliminary warming up on gasoline, and to operate on either fuel oil or gasoline without change. Mr. Queeney explained that a mixture of fuel oil and air coming from a standard carburetor was turned into a dry gas in a gas generator placed between the carburetor and the intake manifold. The generator is heated by exhaust gas and it provides large passages and a relatively large area of heated surface for vaporizing the fuel.

A saving of 5½ per cent in amount of fuel oil used in the new system as compared with gasoline in an ordinary system, and a further saving of 29 per cent in cost of fuel because of difference of cost of fuel oil and gasoline has been accomplished, Mr. Queeney said. Engines operating on fuel oil show satisfactory performance and no evidences of unusual wear.

The gas generator used was developed by Godward Gas Generator, Inc., New York City, for increasing economy of passenger cars and was adapted for fuel oil burning by engineers of the two companies after experiments extending over two years.

Meetings and Events Scheduled for Chicago Show

Jan. 28	Studebaker	Dinner	7.00 P. M.	Palmer House
Jan. 28	Graham-Paige	Luncheon	12.30 P. M.	Palmer House
Jan. 28-29	N.A.D.A.	Convention		Palmer House
Jan. 28-29	Packard Motor Co.	Meetings		Blackstone
	(Exclusively for Packard Distributors)			
Jan. 28	N.A.D.A.	Meeting	10.00 A. M.	Palmer House
Jan. 28	Packard Motor Car Co.	Dinner	6.30 P. M.	Blackstone
Jan. 29	De Soto Motor Co.	Luncheon		Congress
Jan. 29	N.A.D.A.	Dinner	6.30 P. M.	Palmer House
Jan. 29	Nat'l Automobile Dealers Assoc.	Banquet		Palmer House
Jan. 29	Oakland	Dinner	6.30 P. M.	Palmer House
Jan. 29	Auburn	Luncheon	1.00 P. M.	Stevens
Jan. 29	Nash Sales Corp.	Luncheon		Congress
Jan. 29-30	Auto. Elec. Assoc.	Meeting	10.00 A. M.	Stevens
Jan. 30	N.A.C.C. Directors	Meeting	10.00 A. M.	Auditorium
Jan. 30	Chrysler	Luncheon	12.30 P. M.	Congress
Jan. 30	Peerless	Dinner	6.30 P. M.	Congress
Jan. 30	Willys-Overland	Dinner	7.00 P. M.	Palmer House
	(Admittance by card only)			
Jan. 30	Franklin	Luncheon		Blackstone
Jan. 30	Natl. Association of Show and Association Mgrs.	Meeting and Luncheon		Drake Hotel
Jan. 30	Olds Motor Works	Banquet		Congress
Jan. 30	Gardner Motor Co.	Luncheon	1.00 P. M.	Blackstone
Jan. 30	Jordan Motor Car Co.	Luncheon	12.30 P. M.	Stevens
Jan. 30	Gardner Motor Car Co.	Luncheon	1.00 P. M.	Blackstone
Jan. 31	Durant Motors	Luncheon	12.30 P. M.	Palmer House
Jan. 31	Reo	Dinner		Congress
Jan. 31	Marmon Motor car Co.	Luncheon		Blackstone
Jan. 31	Buick Motor Car Co.	Meeting		Blackstone
Feb. 1	Chevrolet	Meeting	1.30 P. M.	Majestic Theater
Feb. 1	Chevrolet	Banquet	6.30 P. M.	Palmer House
Feb. 2	Locomobile Co.	Meeting	2.00 P. M.	Blackstone
Feb. 2	Hupp Motor Co.	Luncheons	12.45 P. M.	Stevens

Rail and Bus Line Formed in England

LONDON, Jan. 19—An agreement that has been reached between the Great Western Railway Co. and the National Omnibus & Transport Co. is one that may form a precedent and have far-reaching effect upon passenger transport in Great Britain. The two concerns will jointly promote a new company with a capital of £5,000,000 to take over and operate all road services for passengers now being run by the respective parties within an agreed area in the western and south western counties of England. The new company will be termed the Western National Omnibus Co. and the parties to the agreement will have equal representation on the board of management.

The agreement has been rendered possible by the new road powers conferred on railway companies by Parliament; besides effecting coordination of road and rail services in the area covered, it will lead to considerable extension of the facilities now available to the public, including through bookings to cover rail and road services to and from all the more important villages and communities throughout the area. The arrangement will also afford the opportunity for making additions to the existing bus services of the two companies.

It is of interest to note that the first regular motor bus service to be established in Great Britain is affected by this agreement, viz.: the 12-mile service between the rail terminus at Helston, in Cornwall, and the Lizard, the latter being the southernmost point of England. This service was started by the Great Western Railway Co. in August, 1903, some months before motor buses appeared on the streets of London.

Radio Joins Conferees

SPRINGFIELD, VT., Jan. 19—As part of the annual conference this week of the officials and sales force of the Fellows Gear Shaper Co., a radio hookup was arranged between C. P. Welte, sales representative at Paris, France, and the residence of E. R. Fellows, president and general manager of the company, where the annual banquet was held.

Finance Firm Enters Italy

WASHINGTON, Jan. 19—Kemsley, Millbourn and Company, Ltd., an American controlled concern, has entered the automobile sales financing business in Italy, according to the U. S. Department of Commerce. It is reported by the department that capital amounting to $500,000 is to be used.

Clark Transmission Begins Production

Newly Formed Company is Latest Addition to Parts Making Group

BERRIEN SPRINGS, MICH., Jan. 21—Clark Transmission Co., which was organized recently by Eugene B. Clark, president of Clark Equipment Co., Buchanan, Mich., and others, starts production in its new plant here today.

The officers of the new company, in addition to Mr. Clark, who is president, are: Eugene B. Clark, Jr., vice-president in charge of sales; Robert Lapsley, vice-president in charge of engineering; A. S. Bonner, secretary and treasurer, and D. A. MacIntosh, factory manager.

"The men who have created a great axle production organization are now taking another step forward and lending their enthusiasm, experience and skill to the design and construction of car and truck transmissions," said Eugene B. Clark, Jr., discussing the activities of the new plant.

"Clark multiple speed transmissions are now in production and our engineers are conferring with automotive companies interested in improving their transmissions. Smooth, continuous full flow of power from the engine to the rear axle is essential to the efficient, satisfactory operation of car and truck.

"Our new plant here at Berrien Springs is designed and laid out for progressive assembly, which, plus the unique Clark machine shop practice, will enable us to produce Clark transmissions in large volume at low cost."

American Eagle Aircraft Denies Velie Purchase

KANSAS CITY, Jan 19.—Reports current in automotive circles that the American Eagle Aircraft Corp. of Kansas City had purchased the Velie automobile and airplane factory in Moline, Ill., were denied here today by American Eagle officials. It was admitted negotiations with the Velie company had been carried on but no definite understanding had been reached. The report the manufacture of automobiles would be resumed in the Velie factory should the American Eagle interests obtain control could not be confirmed.

One company official said the negotiations were virtually off and that the American Eagle's only interest was in obtaining the airplane engine developed by the Velie organization and used in the Velie monocoupe. Some strength was given to the automobile manufacturing report, however, because of the recent election of Barney Oldfield as vice-president of the American Eagle company. The American Eagle company recently was organized with a capital of $1,000,000. A new factory with a capacity of 100 planes a month will be ready for operation soon.

A.A.A. Renames Indianapolis Race

WASHINGTON, Jan. 19—The annual 500-mile Memorial Day race on the Indianapolis Speedway, which since 1911 has been the most colorful event in the world of automobile racing, will henceforth be titled the Grand Prize of America, according to an announcement made today by the Contest Board of the American Automobile Association.

The American Automobile Association also has announced that it will award a suitable permanent challenge trophy to the winners of future races on Memorial Day. The winner each year will be presented with a replica and give possession of the trophy for a period of 11 months.

Other major races scheluded for 1929 have been announced as follows:

Date	Track	Miles
May 12	Akron, Ohio	100
May 30	Indianapolis, Ind.	500
June 9	Detroit, Mich.	100
June 15	Altoona, Pa.	200
June 29	Salem, N. H.	200
Aug. 18	Akron, Ohio	100
Aug. 31	Syracuse, N. Y.	100
Sept. 2	Altoona, Pa.	200
Sept. 15	Cleveland, Ohio	100
Oct. 12	Salem, N. H.	200

The Contest Board at its annual meeting in New York last week removed the disqualification which has stood against William Hickman Pickens since 1924, because of an executive connection with the Ascot Speedway races at Los Angeles. Pickens has been connected with automobile racing since its earliest days, and is now contemplating a dirt track racing circuit on the Pacific Coast.

Timken Steel Mill Ready for 30,000 Tons Monthly

CANTON, OHIO, Jan. 19—More than 30,000 tons of steel a month is the initial capacity of the recently completed Timken Steel & Tube Co. mill, which began full-time operation this week, according to company officials. The mill is said to be the largest plant for the production of electric steel yet completed, the first plant of its kind to be entirely anti-frictionized.

The plant, which includes modern furnaces and rolling equipment, will supply a wide variety of sections and sizes of hot-rolled bar stock and seamless tubing as well as special high grade alloy steels conforming to any analysis specified. The capacity is about equally divided between electric furnace and open hearth steel.

Much of the steel produced will go into the making of roller bearings for the automotive industry, for which the company has on hand orders never before equaled, the officials have stated.

Coming Feature Issue of Chilton Class Journal Publications

Feb. 23—Statistical Issue Automotive Industries.

Producers Will Attend Aeronautical Conference

WASHINGTON, D. C., Jan. 19—The fifth annual Army-Navy conference for the standardization of aeronautical materials and parts will be held at the Naval Aircraft Factory, Navy Yard, Philadelphia, during the week beginning Feb. 11. The conference is open to aeronautical and related industries who are urged to send representatives so that the decisions made may be correlated with latest commercial practice.

Advance information, with tentative preliminary drawings and specifications, may be obtained by any organization wishing to attend the conference, by writing to Army-Navy Standards Conference, care Manager, Naval Aircraft Factory, Navy Yard, Philadelphia.

Kirk & Blum Agent Chosen

CINCINNATI, Jan. 19—Kirk & Blum Mfg. Co., which specializes in pneumatic handling of dust and waste, cooling, vapor absorption, humidifying and hot blast systems, has announced the appointment of Brewster-Nicholas Co. of Cleveland, as its special sales agents and representatives.

Vanadium Moves Office

DETROIT, Jan. 21—The Detroit offices of the Vanadium Corp. of America have been moved from 1355 Book Building to 2440 Book Tower, with C. Newman Dawe as manager of the automotive division.

British Auto Trade Strong in December

WASHINGTON, Jan. 19—British automobile trade set a new high record last month, manufacturers and distributors reporting heavier sales than any previous December, according to reports received by the Department of Commerce from its London office. Leading manufacturers were working full-time with light car firms employing extra shifts, it was said.

Distributors of three of the more popular makes of American cars were unable to obtain sufficient stock immediately to fill orders and some firms handling American cars report more cars sold during 1928 than ever before.

While there was an increase in import trade, automotive exports declined slightly. Manufacturers and traders, however, are optimistic and are looking for increased sales and future improvement, it was reported.

Demand for commercial passenger chassis showed marked improvement and the demand for light and medium weight trucks and delivery vans was above normal. Motorcycle trade was reported as exceptionally good for the season.

Ford Line is Increased With $615 Delivery Car

DETROIT, Jan. 24—To the commercial cars produced by the Ford Motor Co., has been added a de luxe delivery, priced at $615. It is mounted on the Model A passenger car chassis and is a modification of the two-door sedan with the rear side windows blocked off and a door added in the rear panel.

With the adoption of a rear door the spare wheel is carried in a fender well on the left side. Dimensions are as follows:

Length inside	39 in.
Width inside	45½ in.
Height inside	50 in.
Width of rear door	29 in.
Height of rear door	39 in.

Eclipse Buys Starter Patent

ELMIRA, N. Y., Jan. 19—Eclipse Machine Co. has purchased from Aero-Marine Co. of Keyport, N. J., its patent properties on aviation engine starters and will service these products heretofore manufactured by Aeromarine Co.

Calendar of Coming Events

SHOWS

All-American Aircraft Show, Detroit Board of Commerce, Detroit..Apr. 6-14
Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 9-16
Automobile Salon, Inc., Palace Hotel, San Francisco .....Feb. 23-Mar. 2
Boston, Mass., Mechanics Bldg...March 2-9
*Chicago, National, Coliseum, Jan. 26-Feb. 2
Geneva Automobile Show .....Mar. 15-24
Leipzig, Germany, Fair.....Mar. 3-13
Melbourne Automobile Show.....May 2-11
Rome Automobile Show.....Jan. 30-Feb. 16

* Will have special shop equipment exhibit.

CONVENTIONS

Chicago Power Exhibition and Conference, Coliseum, Chicago....Feb. 12-16
Fifth Annual Army-Navy Standards Conference, Naval Aircraft Factory, Philadelphia .....Feb. 11-14
Marketing Executives Conference, Hotel Gibson, Cincinnati .....April 3-5
National Automobile Dealers Association, Palmer House, Chicago..Jan. 28-29